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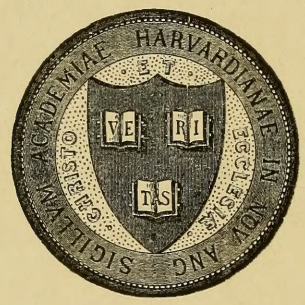

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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FURTHER NOTES ON THE BIRDS, ORCHIDS, FERNS AND BUTTERFLIES OF THE PROVINCE OF QUEBEC, 1929-1930

By HENRY MOUSLEY

WHAT with illness, change of residence, and a very cold and indifferent spring, it looked for a long time as if the hope expressed at the close of my last paper in the May issue of *The Canadian Field-Naturalist* for 1929, "of others yet to come", *i.e.*, memorable seasons, would certainly not be fulfilled—at least in 1929. However, as time went on things gradually improved, and a bad beginning led to a fairly good ending—as will be seen later.

May, 1929.—My first outing did not take place until May 22, when, in company with Mr. Napier Smith, I journeyed to Ile Bizard, the most interesting find being a Robin's nest absolutely on the ground in long grass at the foot of, and under, a very small thorn bush, with a runway leading to it, certainly the most extraordinary situation in which I have ever seen a Robin's nest, although I did find one at Hatley as recorded in the *Auk* for April, 1916, resting on the bare ground under a projecting rock on a sloping hillside. Killdeers apparently had brought off their broods, although young just out of the shell were found near St. Lambert on July 1, and were now scattered about giving vent to their shrill cries of *kill-deer, kill-deer*. Two days later, I was out with Mr. L. McI. Terrill near St. Lambert, when we flushed several adult Woodcock, one of which was covering two young, possibly about a week old. In addition forty-eight other species were observed which included a Wilson's Warbler, a few Long and Short-billed Marsh Wrens, as well as a nest and five fresh eggs of the Marsh Hawk. The day following, May 25th, saw me at St. François de Sales, in an endeavour to locate another nest of the Water Thrush, but no success on this, or other occasions, rewarded my efforts. On May 26th, I was again out with Mr. Terrill, this time at Chambly, when no less than eighty-two species of birds were observed, including nineteen species of Warblers. Two nests of the Sharp-shinned Hawk were found each containing five fresh eggs, as well as one of the Woodcock in which the young were just hatching. Amongst the flowers, fresh blooms of Hepatica and Spring Beauty were found, a somewhat late date, as well as two new stations, one a large one, for the little Ram's Head Lady's Slipper which were only in bud at this date.

June.—On the 3rd, I went to St. François de Sales, in another attempt to locate the nest of the Water Thrush, but all to no purpose, as already indicated. A Bluebird's nest containing six eggs which I had previously found had, in the meantime, been robbed of its contents but in lieu of pictures of the parents feeding their young, which I had hoped for, I obtained some nice ones of a group of Showy Orchids and Yellow Lady's Slippers which were growing nearby. June 4th will ever remain memorable, as on that day I again visited the large station for the little Ram's Head Lady's Slipper, discovered on May 26th near Chambly, when no less than forty-seven out of about seventy plants were in full bloom. They were growing under pine and spruce trees, principally the former, being associated for the most part with such plants as Wild Sarsaparilla, Prince's Pine and Bracken. Never before had I seen such a large colony, and it is a pleasure to know that this rare and curious little orchid is farily well distributed round the district, my youngest daughter having found a new station for it near St. Hilaire, just about this same time. On June 7th I visited a little swamp near Verdun in company with Mr. Smith, who showed me three most interesting nests of the Red-winged Blackbird all built this year, being consecutive ones of the same pair of birds, and all having contained immaculate eggs. Amongst other things that this interesting but fore-doomed swamp (owing to drainage and building schemes) contained, were a nest and set of four eggs of the Rose-breasted Grosbeak upon which the male was sitting as well as a nest and set of eggs of the Virginia Rail near which also a Wilson's Snipe was drumming but no amount of searching revealed its nest. Unfortunately, the locality is overrun with boys and few things have a chance of maturing. The day following I again visited the locality spending five hours at the nest of the Virginia Rail and learning something of the home life of these birds which I have described in a

separate paper. On the 9th I was at St. François de Sales paying a visit to the only known station in the Province for the Striped Coral Root which, fortunately, was in its prime although the Little Ram's Head Lady's Slipper which grows alongside was over, this being the only station for it north of the St. Lawrence River that I am acquainted with. The anthesis of this species is very short indeed usually lasting not more than a week. On the 16th I took a run over to St. Lambert hoping to find that the eggs of the Marsh Hawk had hatched, but the female was still sitting. Waiting another week, I again visited the spot on the 23rd making sure that this time there would be young in the nest, but no such thing, the female was still incubating, now over four weeks, so I concluded something must have gone wrong, which proved to be the case as I found out later on July 1st. On the 28th I was shown a very large cluster of my forma *montropoides* of the Broad-leaved Epipactis (*Amesia latifolia* forma *monotropoides*), which had been gathered on the roadside near Cartierville. Later on and near this same spot a very large colony was found consisting of over one hundred plants.

July.—Dominion Day, the 1st, found Mr. Terrill and myself at the nest of the Killdeer, already referred to, which my friend had found the night before on a coal dump near St. Lambert, when it contained four heavily incubated eggs. Now, instead of these, four beautifully camouflaged young which, apparently, had only just emerged from the shell, met our gaze. We took many photographs of them while the parents kept running round about us, all the time giving vent to their shrill notes *kill-deer, kill-deer.* Finally, we left them in peace, as we made our way to the home of the Marsh Hawk which was not far off. On arrival there we found the female still sitting, so decided to break one of the eggs and find out what was wrong. It proved to have a dead dried up chick inside, which was also the case with the others. Taking the normal incubation period of the Marsh Hawk to be twenty-eight days, the present bird had sat at least eleven days over her time as she was flushed off her eggs on May 24th. For the benefit of those believers in the human reasoning powers of birds, let me quote from Douglas Dewar's *Birds at the Nest*, 1928, p. 32, which says: "If birds are aware that incubation causes eggs to yield chicks, each should know approximately the length of time it is necessary to sit and, possessing this knowledge, should, if it has any idea of time, use what reasoning powers it has and refuse to incubate much longer than the normal period. Observation, however, shows that, when the eggs on which they are sitting fail to hatch, birds continue to incubate long past the ordinary time." From the 5th to the 8th I was the guest of some friends in the Laurentian Mountains near St. Hippolyte, where I was fortunate in finding a plant of the Large Round-leaved Orchis (*Habenaria orbiculata*) with three, instead of the normal two, leaves, for which I propose the varietal name forma *trifolia*. Although apparently uncommon round Montreal I used to find quite a number at Hatley not only of this species, but of *Habenaria macrophylla* as well, but I never saw one of either species with any indication of a third leaf. The plant is now in my herbarium. My best find among the birds was a lovely little nest of the Canada Warbler, situated in a moss-covered pocket on the face of a great mass of sloping rock, which contained a set of four beautifully marked eggs, heavily zoned at the larger end and which hatched out fortunately on the day I left, so that I was able to get photographs of the nest, not only containing the eggs but the young birds as well. My bird census for the present and two previous visits in July of 1927 and 1928 amounts to fifty-two species. On my return home I did not engage in any further field-work until the 20th, when, in company with Mr. Terrill, I spent a most enjoyable day at Chambly, beginning with my finding a record plant of the rare little Lance-leaved Grape Fern (*Botrychium angustisegmentum*), no less than 27.5 cm. in height, thus exceeding the extreme given in Gray's *Manual* by 2.5 cm. It was while photographing this that we heard a peculiar noise, resembling that made by a Saw-whet Owl, which on investigation was found to proceed from a nestling Cuckoo. It was then about 7 p.m., the light not being too good, but we managed to obtain some very fair pictures of the nest and its contents, consisting of one egg and two young birds, one of which was in the stage when the feather shafts had just burst, its appearance being that of a young Cuckoo, whereas the other looked more like a young bristling porcupine, the feather shafts not yet having burst out. The change from this stage which has been called the "mailed" or "porcupine" stage to that of the other is very rapid indeed lasting sometimes not more than six or seven hours. Later on but at another nest, on September 1st, I was fortunate enough to witness this event which has been recorded in a separate paper. It was after leaving the former nest and while taking a short cut to a favourite camping-ground for supper that I found several plants of the Ragged Fringed Orchis (*Habenaria lacera*), this being not only the first record for the locality but a record for height also, as one of the plants measured 73.5 cm. thus exceeding the extreme given in Gray's *Manual* by 13.5 cm. The plant,

which is in my herbarium, shows signs of going to seed which was the case also with most of the Large Fringed Orchis (*H. fimbriata*) we found although a few were still in full bloom. On arrival at the camping-ground and while gathering wood for a fire quite a number of the delicately tinted Pearly Eye butterflies (*Enodia portlandia*) were started up, which apparently had retired to rest for the night on the trunks of some nearby trees. Never before had I seen so many of these somewhat local butterflies together, usually having found them in ones or twos. They are essentially a forest insect, being considered the handsomest of the American Satyrs, their true home being more in the southern States, rather than up here where they are somewhat uncommon. The last item for the day was the finding of a nest of the Maryland Yellow-throat containing one young Cowbird and one of the owner, this species being a very common victim of the Cowbird. The day following, the 21st, I was at St. François de Sales searching for plants of the White Adder's Mouth (*Malaxis brachypoda*) with two, instead of the one characteristic normal leaf, but without success this abnormality being very uncommon (in my experience) in this species, although not so unusual in the Green Adder's Mouth (*M. unifolia*). One interesting plant of the Little Grape Fern (*Botrychium simplex*) was collected, which bore two fertile and two sterile fronds, apparently a case of dichotomous branching.

August.—On the 11th I was out with Mr. Terrill near St. Lambert, photographing a nest and young of the Goldfinch, during which my friend almost trod on a plant of the Hooded Ladies' Tresses (*Spiranthes Romanzoffiana Chamisso*), the first example I had seen around Montreal, although I had studied it intensively at Hatley (*Orchid Review*, March, 1924, pp. 71-77), where it is particularly abundant. Quite a romance attaches to the species for it is found both in the north and south of Ireland, these being the only localities for it in the Old World. Although America is certainly the centre of distribution for the species, it does not necessarily follow that it is the place of origin, there undoubtedly having been a land-bridge between the Old and New Worlds in prehistoric times. After the finding of this plant, another surprise was in store for me for I had the pleasure of seeing a Mourning Dove, a bird still rare in these parts, but which of late seems to be extending its range in the Province, there being several records of its having been seen or taken at places north of Montreal, as well as of one obtained at Hatley in the Eastern Townships, on August 5, 1929. On the 16th, 17th and 19th, I was on this same ground again, making a somewhat complete study of the later stages of the home life of the Goldfinch above-mentioned, which will be found recorded in *The Canadian Field-Naturalist* for November, 1930. Four days later, the 25th, saw me again on this ground, in company with Mr. Terrill, who had found a nest of the Black-billed Cuckoo three days before containing two eggs, which had now hatched, so that the young were certainly not more than three days old at the most. Photographs of these were taken but it was not until September 1st that I was able to visit them again when, as previously mentioned, I was fortunate enough to find both young Cuckoos at home and to obtain pictures of the remarkable and sudden change from the "mailed" or "porcupine" stage into the full plumage of a young Cuckoo which, as already intimated, I have described more fully in a separate paper. Some young Cedar Waxwings photographed on July 25th, had now left the nest, and were hawking (a flycatcher habit quite common with these birds in the fall) with their parents from the tops of some trees in the vicinity of the nesting ground. One example (a female) of the second brood of the Bronze Copper butterfly was seen near a cluster of Golden-rod, which happened to be the host for that curious little parasitic plant the Common Dodder. Speaking of butterflies reminds me that I have not seen a single example of the Monarch either this season or last although in some years after a good migration they are plentiful enough later on in the season as was the case in 1930. The day after this, or September 2nd, Mr. Terrill had the good fortune to discover a station for the rare little Walking Fern (*Camptosaurus rhizophyllus*) near Eccleshill, P.Q., almost on the borders of the State of Vermont, and later, on September 7th and 15th, two stations for the little Maidenhair Spleenwort, one near Levis, P.Q., containing three plants only, the other on Mt. Beloeil, containing 50-60 plants. He also discovered a station in October near Bedford, P.Q., for the Massachusetts Fern (*Thelypteris simulata*), this being the first record for the Province so far as I am aware, although it had been included by Fr. Marie-Victorin in his *Les Felicinées du Quebec*, 1923, pp. 45-46, when, at the time, no actual specimens had been obtained in the Province. In this connection might be mentioned also the finding by this same friend on September 23, 1928, of at least fifty plants of the Fragrant Shield Fern (*Thelypteris fragrans*), which were growing in the clefts of some high rocks at Shawinigan Falls, P.Q. Of the distribution of this, and the other two small species, as well as the Massachusetts Fern in the Province, we have still much to learn and it is thus a pleasure to be able to record new stations for all of them. After my experience with the young Cuckoos, I

imagined the season was about over for surprises, but there was still another awaiting me (but not in this part of the country) that of seeing the Crane-Fly Orchis growing in its native habitat. This was on October 25 (the Annual Field Trip of the American Ornithologists' Union) in the Pine Barrens of New Jersey at Cape May, where grew also the Downy Rattlesnake Plantain (*Epipactis pubescens*), a species rarely found in Canada so far as I am aware. I had previously taken it, however, in New Hampshire and Massachusetts, but the Crane-Fly Orchis (*Tipularia discolor*) I had never seen growing before, although familiar with its roots, having planted a few at Hatley in 1923, that were sent to me from Washington but which unfortunately died out. This is one of the three American species of orchids that send up in the autumn a single leaf which usually persists through the winter. The other two are Calypso (*Calypso bulbosa*), and the Putty Root (*Aplectrum hyemale*), or Adam and Eve as it is called by the negroes of Georgia and the Southern States, owing to its curious root system, consisting of two large globose tubers joined together horizontally, these giving the species its quaint second name. When separated, they are worn as amulets, and were used to tell fortunes with. Concluding this year's ramblings might be mentioned the fact that the few plants I brought away with me of the Downy Rattlesnake Plantain and the Crane-Fly Orchis are still doing well at the time of writing October 10, 1930 although neither of them flowered in the summer.

April, 1930.—If the spring and early summer of 1929 were cold and indifferent, that of the present year was not much better. Killdeer and Prairie Horned Larks commenced nesting about the 20th. One of the former species, which had a nest near Verdun, forsook her eggs during the severe snowstorm of the 24th, but returned to them the day following, her temporary desertion having no ill effects on the eggs, which hatched out in due course. On the 21st, a Woodcock's nest with three broken eggs was found near St. Lambert. On the 30th, a field trip was arranged by the Province of Quebec Society for the Protection of Birds to this same plcae—as in former years—to hear and witness the love song and flight of the Woodcock. On the present occasion, the bird reversed the usual order of things, *i.e.*, by increasing the number of "*peent*" notes before each ascent, instead of decreasing them, which has always been my experience, as recorded in *The Canadian Field-Naturalist* for November, 1927, pp. 183-84. The first ascent was made at 7.15 p.m. standard time, being preceeded by 23 of the curious "*peent*" notes, the second ascent by 31, the third by 91, and the fourth by no less than 141 of these notes, the bird failing, however, to rise at the end of this last delivery, which occurred at 7.40 p.m. Possibly, the new moon on the 28th, not giving much light at the time, may have had something to do with it, as no further flights were attempted. Just previous to the ascent of the Woodcock the song flight of a Wilson's Snipe was watched for a considerable time, the bird being in the air for twenty minutes if I remember rightly.

May.—On the 4th I went to Chambly to take some photographs of a Woodcock that was sitting on a set of four eggs, which Mr. Terrill had found some days previously. The first Spring Azure butterfly was seen on this date as well as some examples of the early Round-leaved Violet (*Viola rotundifolia*) which were just coming into bloom. Just before leaving, I flushed another Woodcock from the centre of a little footpath I was following, but having no time to spare I was unable to search for the nest. However, I returned to the spot on the 8th, and was not long in locating the nest on a mound at the foot of a small pine tree, its contents consisting of the usual four eggs, upon which—presumably—the female was sitting, the site being only eight yards from the spot where I had flushed—possibly—the male on the 4th. So tame was the bird, that I had no difficulty on this, and subsequent occasions, in photographing it in all sorts of attitudes as it varied its position in the nest. On the 10th I had the pleasure of showing it to a large number of the members of the Bird Society whom it allowed to approach at very close quarters without so much as "blinking" an eye. Alas! what so often happens to these unfortunate ground nesters was seen on the 17th when, on arrival, I found the nest empty, one broken egg being one foot six inches from the nest, another three feet, whilst the remaining two were nowhere to be found, the work of some predaceous animal no doubt. Thus ended my prospects of a super-picture of the old bird transporting her young, which we are all striving for, but which has never yet been obtained, so far as I know. Reverting to the 11th, sixty species of birds were observed, amongst which was a Towhee (seen by Mr. Terrill) a rare bird in these parts. On the 22nd, I was on Ile Bizard with Mr. Smith, when two nests of the Killdeer were found, besides several of the Song and Swamp Sparrow. Two Wilson's Snipe were indulging in their song flight, but no amount of searching revealed the nest. The day following, I visited a small swamp near Snowdon, the best bird seen being a Sora, which is not nearly so common in these parts as the Virginia Rail. On the 28th, I visited some woods at Côte St. Luc, only to find that a nest and eggs of the

Canadian Ruffed Grouse that I had photographed a few days previously, had been robbed of its contents, a fate that often befalls this ground nester, as well as the Woodcock. On the 29th, I was again on Ile Bizard with Mr. Smith, the two Killdeer's nests now containing four eggs each. Although it rained slightly most of the time, some excellent photographs weer obtained of these as well as nests and eggs of the Spotted Sandpiper, Yellow Warbler, and Red-winged Blackbird, a nest of the latter being especially interesting being situated on the ground in the centre of a little tuft of grass all surrounded by water.

June.—On the 2nd and 3rd I paid my first visits for the season to St. François de Sales, both these days being memorable ones, as I practically spent most of the time following, watching, and listening to the song of, a Mourning Warbler, a bird which previously I had never had a good opportunity of observing closely. The song was almost continuous, reminding me of the song of the Water Thrush only that it was not so wild and ringing besides being less in volume. Unfortunately from one cause and another I was unable to visit the spot again, but am hoping that next year may see it there once more and that I may have the luck to find its nest. On the first of these visits, a station for the Narrow-leaved Spleenwort Fern was found, and amongst the butterflies seen were examples of the Black and Tiger Swallow-tails, as well as the Silver-spotted and Dusky Skippers. On the 8th I went to Chambly in company with Mr. Terrill, when forty-five species of birds were observed, amongst which were two Canadian Ruffed Grouse with their broods, out of which we managed to capture and photograph two chicks. The little Ram's Head Lady's Slipper was practically over, but amongst the butterflies we found a new station for the Arctic Skipper which was just emerging. On the 29th I motored to Hatley remaining there, more or less, until July 19th. During the visit sixty-three species of birds were observed. A Wilson's Snipe apparently was breeding on "the marsh", as it was heard drumming one morning at 7.30 a.m.; a Solitary Sandpiper was seen on the 16th, whilst large numbers of Purple Martins were observed at Sherbrooke and Coaticook. Another interesting item was the finding of a colony of Cliff Swallows on a farm that had never had any for at least twenty years to my knowledge the birds having become very scarce in the district of late years. There nests and eggs of the Alder Flycatcher (*Empidonax traillii traillii*) were found, and a partial study made of their home life, an illustrated account of which was presented at the meeting of the American Ornithologists' Union at Salem, Mass., on October 22, 1930. Amongst the ferns, examples of the rare little *Botrychium minganense* and *B. onondagense* were obtained, but best of all a station was at last found at Hatley for the Board-leaved Epipactis (*Amesia latifolia*), an orchid that had so far baffled all my efforts to discover it until 1928, when several plants were found near Cassville—as already recorded in *The Canadian Field-Naturalist* for May, 1929, p. 98—about ten miles or so from the present site. Certainly, there was only one plant of which a photograph was taken but it is hoped others will spring up and form a colony before long. Curiously enough, the date on which I discovered it was June 30th, this being the exact date in 1928 that I had found others at Cassville.

August.—After my return to Montreal on July 19 (as already stated) I did not engage in any field work until August 10, when in company with Mr. Terrill, I found six nests of the Goldfinch and two of the Cedar Waxwing near St. Lambert and, incidentally, obtained some photographs of the R-100 as she left the mooring mast at St. Hubert, on her way to Ottawa.

September.—From the 7th to the 11th I made a further study of the home life of the American Goldfinch which has been recorded in the December issue of *The Canadian Field-Naturalist* for 1930, pp. 204-07. Of other birds seen, the most interesting were two Short-billed Marsh Wrens, and a Wilson's Warbler, while quite a number of the Monarch and Hunter's butterflies were observed in perfect condition.

October.—On the 1st I was out near Oka, this being a red letter day, for on it I was shown a newly discovered station—the only one for the Province—for the Putty Root orchid (*Aplectrum hyemale*), or Adam and Eve as it is sometimes called, on account of its peculiar root system—which I have already described—not having any idea at the time, that I was so soon to see it actually growing in its native habitat. This was a large deciduous wood composed principally of oak trees, with very little undergrowth. On mounds, especially when near trees, several small colonies were found numbering from fifty to sixty plants in all, of which I obtained some very fair photographs. On the 19th I journeyed to Boston en route to attend the yearly meeting of the American Ornithologists' Union which was being held at Salem from the 20th to 24th. Possibly this was one of the most successful meetings held for some years, at all events it gave me the opportunity of again seeing the Ipswich Sparrow, the field day on the 24th (at which about eighty members and guests were present notwithstanding its being a rainy day) being spent among the

sand dunes at Ipswich under the guidance of Dr. Chas. W. Townsend, an old friend of mine, and with whom I spent a further ten days at his home overlooking the marshes and sand dunes seeing some fifty to sixty species of birds, besides witnessing one of the highest tides in many years.

November.—On the 4th I returned home to Montreal, this ending my activities for the year.

THE TRUE STORY OF A PET PORCUPINE

By ALFRED KAY

MY EXPERIENCE with a pet porcupine so changed my opinion of the intelligence and character of this species that I think some account of it may be worth recording.

Early in May, 1925, we got a very young porcupine, I should think about a week old, and we decided to try to raise him as as a pet. At first we fed him with cow's milk, a few drops at a time from a glass dropper. After a while he took the milk from a small teaspoon, and finally from a bottle with a rubber nipple. Sitting up on his haunches, the bottle gripped between his front paws, he would soon empty it. Then he learned to feed on bread and milk out of a saucer, and ultimately vegetable matter, chiefly lettuce, of which he was very fond.

He grew rapidly, and seemed to have no fear of anyone whose voice he knew. He became quite affectionate, would climb all over us, and liked to go to sleep on our laps or shoulders.

The dog and cats soon got quite used to him. The dog would attack every wild porcupine he saw, but would let Dintie (for so we had named him) go into his kennel and sleep with him. A short time after we got him feeding out of the bottle, both our cats had kittens, and Dintie would climb into the box and sleep with the kittens. He soon learned to help himself and seemed to thrive on the cats' milk. The mother cats did not object, but became very fond of him, and months afterwards when he had grown much bigger than they were, he would put both front paws round the cats' necks and they would lick each other's faces, showing every sign of affection.

Dintie never forgave anyone who hurt or teased him, but would raise his quills and scold whenever he heard the offender's voice. He was hard on the lettuce patch, and my wife would chase him out of it with the broom, and if he heard her coming, he would start to scold, run for the house, climb up at the back of the porch door, sit down and go through all the cuss words he knew in the porcupine language. But if I came in and spoke to him, he would whimper like a spoilt child, climb down to my shoulder, lay all his quills (of which he had a good crop) down until you would not know he had any, and nuzzle me about the neck and face, all traces of anger gone.

When winter came, he would go every fine day to a white birch tree that grew close to a well-beaten path, climb up and stay there most of the day, eating the tips and bark of the small limbs. About four-thirty in the afternoon he would start for home, come into the house, get a piece of bread, and then go over to the barn where he made a sleeping den under the gang-way. On cold, rough days he would remain in the barn and live on hay and oats, though always ready to climb to the shoulder of any one whom he liked, and come into the house to be petted or given something to eat. He considered cheese a treat, but was wild about chocolates. If he smelt them, he could not be kept away from them, and when they were all gone, if we gave him the empty box, he would snatch at it, smell it inside and out, then throw it down in quite a temper. One day in summer we were eating chocolates when Dintie made himself such a nuisance that we put him out at the kitchen door and shut him out. He ran just as fast as he could round the house and came in at the front door, which he must have known was open, and was up on the table and climbing over everyone hunting for chocolates; so, of course, like the spoilt child he was, he had to be given some more.

The first summer we had him, when he was quite small, he would climb up my leg and sit on my knee and go to sleep while I was taking my meals. I was surprised to see the real intelligence he exhibited, for I had always considered porcupines to be stupid creatures, but I know better now. He was capable of showing great affection, and was possessed of a wonderful memory. Many strangers came and took his picture. He was quite a centre of attraction. He would wander about the farm, and the second summer, when he was over a year old, he must have been mistaken for a wild porcupine and killed, for he disappeared entirely and we never saw him again, and I think he was too fond of his home to go away and stay away of his own free will.

CONTRIBUTIONS TO THE KNOWLEDGE OF EXTREME NORTH-EASTERN LABRADOR

By BERNHARD HANTZSCH
TRANSLATED BY M. B. A. ANDERSON

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(*Continued from page 224, Vol. XLV*)

[P. 245]

COMMUNICATIONS concerning the mammals of the district now follow. Eskimo hunters could not exist at all without the mammals. The Eskimos travel about and change their habitations according to the occurrence of the different species, in order to hunt with the greatest possible success. In these districts the flesh of animals serves as the most important supply of food, incomparably more than that of birds and fish. The Eskimos use their fat as the most important material for lighting and heating, their skins for clothing, tents and other objects, their sinews for thread, even their bones and teeth for certain tools and weapons, quite overlooking what significance the dog has as the only tame animal. Even if at present because of closer association with the whites, many tools formerly fashioned patiently from parts of the bodies of animals are being acquired by trade, the mammals still furnish to the Killinek Eskimos the bulk of the articles accepted by the station in trade, such as seal skins, which are salted or dried for export, boots made from these, that are worn by the Newfoundland fishermen especially, seal blubber, which they try out for oil, all kinds of skins, which are suited for fur work, occasionally even hides and teeth of walrus and other things besides. [246] The value of the other products of the country traded at Killinek, such as stock-fish, salted trout, fish-oil and eider-down is a great deal less in comparison with these products. Compared with the other Moravian mission districts of Labrador, Killinek has the reputation of being quite a good hunting place, while the more southern stations show more favourable returns in fishing. Since careful investigations in respect to the mammals have never been carried on in the district, it remains a question, whether all the smaller species cited by me, especially where they are not considered as fur-bearing animals, go up northward in this district or find the regular limit of their distribution area in the more favourable parts of Ungava Bay. In like manner, material for many of the whale species is lacking from this restricted area. I give very careful descriptions only in the case of species of animals, which are of unusual significance for the domestic use of the population. The table of prices, perhaps of interest, which are pa'd by the stations of the Moravian missions, applies only to skins in winter, and is subject occasionally to even greater changes than I indicate. In the systematic arrangement and nomenclature, I am guided with a few unimportant exceptions by *A List of Land and Sea Mammals of North America, Supplement to the Synopsis of the Mammals of North America* by D. G. Elliott, Columbia Field Museum, Chicago, 1901.

List of the mammals identified for this district which occur there in all probability.

Balæna glacialis Bonnat. Schwarzer Walfisch. Arvek. [*Eubalæna glacialis* (Bonaterre)].—NORTH AMERICAN RIGHT WHALE.—At the present time this whale and the following right-whales have become exceptionally scarce. A dead individual is driven up on the beach only in exceptional cases, though this apparently happened often in earlier times. The ribs of the animal are still to be seen as rafters of old Eskimo houses. No regular hunting of the whales on the part of the whites is pursued in these waters. The whales are said to swim into Hudson Strait in April and May, and they pass by again on the return journey in the autumn.

Balæna mysticetus. L. Grönländischer Walfisch Arvek.—RIGHT WHALE. BOW-HEAD.—At the present time an adult has a value of 60,000 to 80,000 marks [$15,000 to $20,000].

Balæna australis Desmoul.[1] Südlicher Walfisch, SOUTHERN WHALE.—Only in exceptional cases goes up into North Atlantic.

Megaptera nodosa (Erxl.)[2]. HUMPBACK WHALE. Keporkak ? Rare.

Agaphelus gibbosus (Erxl.) Knotenfisch.[3]

Balænoptera acuto-rostrata Lac. [Lacépède] Sommerwal.—PIKE WHALE. Tigagulik ? Rare.

Balænoptera physalus (L.) Finnfisch.—COMMON FINBACK WHALE. Pauniuligarsuvak. Not frequent.

[1] This species is now considered as synonymous with *E. glacialis* (Bonaterre). See Miller, *N.A. Recent Mammals* U.S. Nat. Mus. Bull. 128, 1924, p. 504—R. M. Anderson.

[2] *Megaptera nodosa* (Bonaterre) Tabl. Encyclop. et Method Regnes Nature, Citologie, 1789, p. 5,—R.M.A.

[3] Considered as synonymous with *Balænoptera acutorostrata* Lacépède. See Miller, *N.A. Recent Mammals*, 1924, p. 506.—R.M.A.

[4] This species is now placed in genus Sibbaldus Gray, 1864, as *Sibbaldus musculus* (Linnaeus). See Miller, 1924, p. 506.—R.M.A.

Balænoptera borealis Less.—POLLACK WHALE.

Balænoptera musculus (L.) Blauwal.—SULPHUR-BOTTOM. Tunnolik ?[4]

Physeter macrocephalus L. Pottfisch.—SPERM WHALE. Tiggagollik ? . Not frequent.[5]

Hyperoodon rostratus (Müll). Dögling.—BOTTLENOSE WHALE.[6]

Mesoplodon bidens (Sow.) SOWERBY BEAKED WHALE.

Monodon monoceros L. Narwal.—NARWHAL, Aglangoak. Rare. During my presence south of Killinek a large, but broken tusk was found there.

Delphinapterus leucas (Pall.) Weissfisch.—WHITE WHALE. Kellellugak.—Frequent at many times. Observed by me also several times. Caught in nets by the inhabitants (in the fall of 1906 about 60), or shot. They eat the flesh, and relish the cooked skin particularly. The oil is prepared at the station.

Phocæna phocaena (L.) Braunfisch.—HARBOUR PORPOISE. Nisa. Nisarsuk.—Not very rare

Orcinus gladiator (Bonnat) Schwertfisch.—ATLANTIC KILLER WHALE.—Pauniuligarsuk. Not very rare.[7]

Globiocephalus melas (Traill) Grind-Delphin. BLACKFISH; PILOT WHALE; CA'ING WHALE.[8]

Gramphus griseus (Cuv.)—GRAMPUS.[9]

Lagenorhynchus acutus (Gray).

Lagenorhynchus albirostris Gray.—WHITE-BEAKED DOLPHIN.

Tursiops tursio (Fabr.) Tümmler.—BOTTLENOSED DOLPHIN.[10]

Prodelphinus euphrosine (Gray).—NORTH ATLANTIC DOLPHIN.

Rangifer tarandus arcticus (Rich.) Renntier.—CARIBOU. Tuktu.[11]

The caribou which occur in these districts might belong to this tundra form, in spite of their desire to travel as a rule in small numbers. On rare occasions small herds or scattered individuals lose their way, and come up as far as the Killinek Islands, crossing frozen parts of the Ikkerasak during the winter or swimming across at other times. Farther to the south and farther in the interior of the country the caribou become more plentiful. The Eskimos travel by sled in the later part of the spring to those districts, also on foot in late summer to hunt the valuable game. The small herds are usually quite shy. As far as the Eskimos are able to do so, they bring to the coast skins and meat of the caribou that are killed. The broad back sinew is especially prized. It is dried, pulled apart like thread, moistened and smoothed with the fingers, and then used as exceedingly strong thread for sewing on leather and fur material. Such sinew has to be imported into Killinek from the more southern stations, where there are more caribou. The natives use the skins as covers for beds, only rarely for clothing. Flesh, tallow, liver, etc., also the stomach contents, are relished. [P. 248] To carry out the repeatedly agitated proposal of introducing reindeer into these districts, and to get rid of the dogs for this purpose, I consider a very hazardous interference with old habits and customs in the life of the population.

Arctomys monax ignavus Bangs. Murmeltier.—LABRADOR WOODCHUCK.[12]

Peromyscus maniculatus (Wagn.)[13] Avingararsuk.—WHITE-FOOTED MOUSE.—This pretty mouse is rather frequent in places; I observed it repeatedly and also collected it. Their holes in the ground are noticed more frequently than the creatures themselves. They seem to dig down very deep and thus escape the winter's cold. They often come into the houses and nibble at meat and bacon. They keep a cat at Killinek which hunts the intruders diligently, but has to be carefully watched to protect it from the dogs. Mice and rats are said to reach the coast occasionally on ships, but apparently they soon perish.

Evotomys rutilus (Pall.)[14]

Evotomys ungava Bailey.

Microtus pennsylvanicus labradorius Bailey. Labrador Kurzohrmaus. Nunivakak.—LITTLE LABRADOR MEADOW MOUSE.[15]

Microtus enixus (Bangs).

Synaptomys innuitus medioxinus Bangs.

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[5] *Physeter macrocephalus* is now considered a synonym antedated by *Physeter catadon* Linnaeus. See Miller, 1924, p. 507.—R.M.A.

[6] *Hyperoodon rostratus* is now considered a synonym antedated by *Hyperoodon ampullatus* (Forster), 1770. See Miller, 1924, p. 516.—R.M.A.

[7] Synonymous with and antedated by *Orcinus orca* (Linnaeus). See Miller, 1924, p. 511.—R.M.A.

[8] Species now stands as *Globicephela malæna* (Traill). See Miller, 1924, p. 512.—R.M.A.

[9] Listed as *Grampus griseus* (Cuvier). See Miller, 1924, p. 511.

[10] Now stands as synonym *Tursiops truncatus* (Montague), 1821. See Miller, 1924, p. 509.—R.M.A.

[11] The Ungava form of Barren Ground Caribou has been described as *Rangifer arcticus caboti* G. M. Allen, Proc. New England Zool. Club, Vol. 4, p. 104, with type locality "Thirty miles north of Nachvak, Eastern Labrador."—R.M.A.

[12] Now listed as *Marmota monax ignava* (Bangs) type locality Black Bay, Strait of Belle Isle. "Known only from vicinity of type locality; probably sorth to Hamilton Inlet." Miller, 1924, p. 174.—R.M.A.

[13] Undoubtedly true *Peromyscus maniculatus maniculatus* (Wagner), which ranges from north of timber line to border of Canadian zone. This is probably the only form of the species which ranges north of the timber line.—R.M.A.

[14] The generic name *Evotomys* Coues (1874) has been shown to be antedated twenty-four years by *Clethrionomys* Tilesius ("Glirium species in Bavaria nonnullae," *Isis*, No. 2, 1850). The type form *rutilus* is restricted to the Old World, and *C. ungava* is only known from Fort Chimo, Ungava Bay. Hantzsch has no actual records of specimens, and as *C. gapperi proteus* (Bangs) has been taken at various points on the Labrador coast, it is probably the prevalent form of Red-backed Mouse.—R.M.A.

[15] The only authentic records we have for *labradorius* up to the present time are from Fort Chimo, Ungava Bay, the type locality, and a few points on east shore of Hudson Bay. *Microtus enixus*, large Labrador vole, has been taken at various points on eastern Labrador coast.—R.M.A.

Lemmus trimucronatus helvolus (Rich.).—These later species apparently rare or as a rule only in the southern part of the district.[16]

Dicrostonyx hudsonius richardsoni Merriam.—RICHARDSON'S LEMMING. Avingak.[17]

In the vicinity of Killinek this rodent is by no means rare, but in many years is said to be quite frequent, even if not occurring in bands. The creatures dig rather deep, broad tunnels and have undermined the ground in places to a wide extent. They are shy and are not easily caught in spite of a certain awkwardness. When wounded, they are said to bite viciously. You see them running about most frequently toward evening and in the morning, and hear their squeaking voice. The Zoological Museum in Dresden has secured from me a number of the summer skins which are rare in collections.

Fiber zibethicus aquilonius Bangs. Bisamratte. LABRADOR MUSKRAT. Kivgaluk.[18]—Rare in this district; the farther south, the more frequent. Paid fifteen cents for skin.

Zapus hudsonius ladas Bangs. Springmaus.—LABRADOR JUMPING MOUSE.

Lepus arcticus bangsii Rhoads. Polarhase.[19]—ARCTIC HARE. Ukkalek.—Quite rare north of the Ikkerasak; towards the south in varying numbers according to the years; on the whole not particularly common. Paid at most for winter skin ten cents. Whether the Labrador hare from the south of Ungava Bay (Fort Chimo) described *L. a. labradorius* Miller, is really to be placed with the above form, and whether it occurs in this district, must be investigated more carefully.

Canis occidentalis Rich.—WOLF. Amarak.[20]—Is killed rarely, not even annually; seems to inhabit the high plateaux of the interior of Labrador which have an abundance of caribou. I secured the skull of a young wolf taken by Julius Lane, now in the Zoological Museum in Dresden, which [P. 249] shows scarcely any difference from the skull of an Eskimo dog. Crosses between male wolves and female dogs are said to occur in exceptional cases, although there is generally enmity between the creatures. As was told me, male wolves occasionally follow sleds for many hours without especial fear, before which there are female dogs in heat.

Canis familiaris borealis Dism. Eskimohund.—ESKIMO DOG. Kingmek.—This one domestic animal of this district deserves a detailed description. From outward appearances the resemblance of many Eskimo dogs to wolves is so great, that without further information you are inclined to the view that this race of dogs represents only a tame product of that beast of prey. The manifold variation of the original wild colour into black, white and brown, occurs in all the domestic animals; spotted dogs are seen most frequently. The Eskimo dog possesses much that is like a wolf in his characteristic inclination for companionship with his own kind, combination of cowardliness and wild courage in his nature, desire for hunting and bloodthirstiness toward other creatures, and, above all things, a thoroughly wolf-like, long drawn-out howling or whining voice, of which he gives evidence in horrible concerts especially during bright nights; the creatures do not utter a peculiar baying but at the most, short, yelping sounds. All dogs of an owner who is liked by them, so that they apparently get along well together, stay of their own free will in the vicinity of the house or tent, and know one another and know that they belong together. A good dog team is composed of eight to twelve dogs. Even more dogs are occasionally added though the number often dwindles down to two or three; with such a weak team nothing much can be done. They occasionally build the dogs a shelter out of snow. The creatures also like to seek shelter in summer during rainy and stormy weather. But once in a while they are seen lying in the front room of a house in evil-smelling heaps, over which you stumble easily in the dark, as in the southern mission stations, because the poorest Killinek people live in houses. They tie newly-acquired dogs, or such dogs as wander too far away, by fastening a fore-foot to their neck, or they hang a big stick of wood on them, to hinder them from quick movement. A regular feeding of the dogs takes place when they use them for sled trips. During the rest of the time they give the dogs the leavings from the game and the housekeeping, but otherwise trouble themselves very

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[16] Hantzsch is undoubtedly in error in attributing this form to Labrador. *L. helvolus* is known only from northern British Columbia, possibly extending into northwestern Alberta and southern Yukon. *Lemmus trimucronatus*, the Back Lemming or Brown Lemming is known to occur commonly on Southern Baffin Island and on west side of Hudson Bay. Considering the known tendency of this species to periodical migrations, even out on the sea ice, it is not improbable that specimens have come across to the Ungava Peninsula, but I know of no records of such occurrences.—R.M.A.

[17] The Labrador Collared Lemming has generally been considered as a distinct species. *Dicrostonyx hudsonius* (Pallas). The species found on the west side of Hudson Bay is *Dicrostonyx rubricatus richardsoni* (Merriam). The former is of a generally grayish colour and the latter more brownish but not nearly so reddish as the Alaskan form, *D. r. rubricatus* (Richardson).—R.M.A.

[18] The Labrador Muskrat is now known as *Ondatra zibethica aquilonia* (Bangs).—R.M.A.

[19] The status of *Lepus arcticus labradorius* was in doubt for many years, but Allen and Copeland, *Journ. Mammalogy*, 1924, 11, have examined new material and consider it a valid subspecies, recording specimens from Pamialuk, Makkovik, Rama, and Hopedale.—R.M.A.

[20] D. G. Elliott in 1900 referred Quebec wolves to *Canis occidentalis*, but as now understood *occidentalis* is confined to the northern interior forests west of the Mississippi River and Hudson Bay (Miller, Smiths. Coll., 1912), and the name *Canis lycaon* Schreber (1775) must stand for the wolves of Eastern Canada and the United States. Wolves intergrade so freely that the tendency of American naturalists is to consider all the large North American wolves as subspecies of the Mexican wolf, *Canis mexicanus* Linnaeus (1766).

little concerning them. Therefore some of the dogs, or whole bands of them, often take long journeys to hunt food on their own account. They find bodies of animals washed up on the seashore, mussels, etc., and since they are not particular they soon dispose of their finds.

They eat everything eatable in hard times, and in this way take care of the hygienic cleaning up of the Eskimo dwelling places. They even eat human fecal matter greedily [P. 250], and lurk often in the background, when an unarmed person secretly leaves the tent. The zoologist, who is collecting skulls of animals, might make great finds near the Eskimo camp, but scarcely ever does he find a thing that is not gnawed and damaged by the dogs. The creatures even hunt up human graves and rob them, if the stone work is not fitted on firmly. In spite of the fact that they can stand hunger for many days, they are able to consume an astonishing amount of foodstuffs; it is not so easy to satisfy their gluttony. If you feed the same beasts several times, they soon come up and hang around you, whenever you show yourself. I had some favourite dogs, especially a fine male dog by the name of Tiger, that was a fine, good fellow; also a timid, suckling female, and lastly a lean, impudent young dog.

I gave them the remains from my bird preparation and thus won their confidence. When I opened my door on mild evenings to let fresh air into my room, big Tiger soon announced himself by a joyous, whining, fawning and wagging of his tail, lay down before the door, and put his beautiful big head with his confiding eyes on the threshold; thus he waited patiently, until something fell down for him.

The dogs were never permitted to enter the room; they might do great damage and are not clean enough for a room. They knew the prohibition quite well, and were afraid of the blows they would get, if they were caught inside. You close the tent entrances carefully when you have to be away only on account of the dogs. Indeed it is not advisable to leave the camp for any length of time without a gurad. Whenever I stepped out of the house alone, a whole pack of dogs often surrounded me, jumping up on me with good-natured growling, and pushing me with their muzzles. Often they tried to lick my hand, a thing I sternly forbade. But I never observed that they wished to bite. If a dog does this in a bad humour, the owners almost always kill him. Many times they snap at your hand from mere friendliness and desire to play, as if they wished to make plain their desire to get something. This might turn out badly of course. If you wish to give them something to eat, they try to tear it out of your hands, and can hardly be controlled. If you throw the bit at them, they plunge upon it, everyone pounces on it in a moment's time, and as a conclusion of this feeding of these beasts of prey, the whole band tear loose upon each other, so that the onlooker becomes anxious. Their raging battles which now and then lead to severe wounds in spite of their shaggy coats, especially if a female is concerned, are just as frequent as disgusting and would make it impossible to permit Eskimo dogs to run loose in this country. Toward human beings the dogs usually act in a cowardly way and quite like other dogs. If they become troublesome, as a rule you only need to bend [P. 251] down as if to pick up a stone, and they slink away at once with hanging head and tail. They are cunning enough to watch to see whether you are in earnest about throwing the stone or not. When the dogs belonging to the mission jumped about me in play, and I would keep them at a distance by picking up a stone, they would retreat a few steps, but crowded against me with sly looks on their faces and playful noises, as if they knew they would get along all right with me, the dog's friend. Paksau acted differently; he caught hold of the first stone in reach and threw it among the dogs with all his strength, quite indifferent where it would strike, so that the dogs soon retreated.

Little children have to be watched on account of the dogs. They say the dogs would jump on a child if one fell to the ground. They are said to do this with grown-up people too, and different reports tell how people have been injured by dogs, indeed even eaten by them.

The female dog gives birth to six, eight and even more young in a secluded place, and protects them from the male dogs, which occasionally show toward their progeny the nature of the beast of prey. Often a strong male dog will voluntarily give her assistance. The splendid "Tiger" was the knightly guard of a growing litter and plunged at once on other dogs that came near the little creatures with bad intentions. Otherwise he was not quarrelsome for his one and a half years, but he knew how to procure respect here by his strong bite. When the pups are larger, the owners have to take care of them, and this is the special task of the Eskimo children. They drag the little whining creatures around and play with them in such a careless way, and so treat them that we would call it torture. If they do not become familiar with human beings in this way, the young dogs are said to be so wild and timid that they cannot be caught or even approached within gunshot, and taming them is out of the question. The Eskimos usually take the dogs with them on very long journeys in the summer; in the winter they use their

strength and endurance as animals to draw the sleds. They hitch the dogs before the sledges with simple walrus hide harness with traces two to five meters in length; guide them by shouts and a long whip with a short handle, and in this way accomplish the quickest and safest travel across the country, that is possible in those districts. In this neighbourhood they use the dogs only in exceptional circumstances for hunting and carrying packs, as is the custom elsewhere in different Eskimo bands.

The price for strong sled dogs is regulated according to quality, age and appearance, the number of animals available and the demand, which varies considerably. The price averages four to five dollars; for good lead dogs, which pull steadily and willingly, double that amount. When the dogs become old, sick or when they bite, they are killed, usually by hanging.

The flesh is not particularly relished, especially at the present time, and not at all if the animal was sick. Epidemics occur occasionally among the dogs, which often cause the loss of a whole team [P. 252]. Young animals often die of distemper. The skin is worth twenty to fifty cents, sometimes as much as a dollar. The skin of young dogs is most prized and serves as trimming for the edge of hood, sleeves, etc.

Vulpes pennsylvanica (Bodd.) Fuchs.—Fox. Terrienniak.—Not rare, even if here on the northern border of its range. The red phase is the most common, the skin having a value of four to five dollars; the Cross Fox (Eskimo, *Akkonavtok*) is more rare, valued at about six dollars, occasionally even more. Rarest of all is the Silver Fox (Eskimo, *Kernek*), the white tips of which now and then disappear completely, and the animal then looks entirely black. Its skin is worth fifty to one hundred dollars; in some black specimens as much as three hundred dollars. For such valuable skins the Eskimo receives the half of their value at once in his account book, the other part later according to the price which the skin brings in London. They catch at least one and sometimes several of the highly-valued silver and black foxes in this district every year. All three colour phases are said to occur as brothers and sisters in the same litter.

Whether the range of the smaller red fox species, *Vulpes deletrix* Bangs extends northward as far as this district is uncertain.[21]

Vulpes lagopus ungava Merriam. Polarfuchs. Terrienniak.—LABRADOR ARCTIC FOX.—The most frequent species of the larger wild land mammals of this district; also observed by me several times. Their tracks are to be seen anywhere in the snow. The White Fox (Eisfuchs; Eskimo, Kakkortassuk), which is white in winter, is the most common, the skin is worth about four dollars. The blue-gray phase, The Blue Fox (Blaufuchs; Eskimo, Amgasek) is much rarer and is only caught occasionally, skin worth about six dollars. The abundance of the white foxes varies rather noticeably. The animals are so numerous in many winters, that they can be seen every where and fifty to sixty may be caught by one person. Since it is said that in such years there are also many ptarmigan and hares, the favourite food of the foxes, it is not improbable that these sharp-witted beasts of prey often go long distances, especially to the coast from the interior of Labrador, during the autumns in which there is little food and establish their winter quarters in such localities, where food is to be found. In other years the foxes are exceedingly rare, and the number of those caught drops to one-third of the usual number, and even less. The white fox always forms the most numerous and the most important material of the fur-trade in these districts, when the Eskimos themselves possess no traps. Traps are lent to them by the station authorities, mostly steel traps, more rarely fox-traps which are, of course, suited for other medium-sized animals. All the Company people are in duty bound to sell the skins of the animals caught at the station. The prices are set in London annually, according to the wholesale prices received during the preceding year, for all the mission stations on the Labrador coast, hence change according to the demand and the fashion. The Eskimos often try to sell the skins secretly at a somewhat higher rate [P. 253] though there is little opportunity in Killinek for that. This method of dealing is the regular thing in the more southern stations. For example, I was myself offered in Nain at least twenty fox-skins. This surprised me so much the more, as I had been told by the mission trade inspector for Labrador that every Eskimo who would sell skins elsewhere would be shut out from trade absolutely—the greatest punishment that can be held over the natives by the mission for any sort of grave offense.

I should have liked to take some things home

[21] How far the mammalogists are justified in separating the closely allied geographical races of the common Red Fox into distinct species is still a matter which is unsettled. At any rate, *Vulpes pennsylvanicus* (Bodd.), for the Eastern Red Fox, is now considered a synonym of *Vulpes fulva* (Desmarest), which is recognized as the form inhabiting the north-eastern United States, Quebec, Ontario, and Northern Manitoba west of Hudson Bay. Geographically the Red Fox of the Labrador coast is presumably *Vulpes rubricosa bangsi* Merriam the Labrador Red Fox, stated by Outram Bangs (1910, p. 667) to be common throughout the whole of Labrador from the St. Lawrence to Hudson Strait. Probably *fulva* and *rubricosa* intergrade somewhere in the interior of northern Quebec, as it is well known that *Vulpes fulva rubricosa* (Nova Scotia), *bangsi* (Labrador), *deletrix* (Newfoundland), *alascensis* (British Columbia, Yukon and Alaska), and *kenaiensis* (Alaska) all interbreed freely on the fur farms.—R.M.A.

in an honourable way, as souvenirs, such as a well-prepared fox for our Dresden Zoological Museum. I was told however, that this would be possible only through the Mission agent in London at the trade price, which could not be determined until the skins were sold during the coming winter.

In marked contrast to the regulations quoted to me, which also made it impossible to secure some skins for scientific purposes, is the communication of Governor MacGregor: Report, 1906, p. 31: "The natives are at perfect liberty, at all the stations to sell to others than the mission if they choose to do so. They do actually dispose of a certain quantity of things, especially of boots and fur to fishing schooners and traders; but the great bulk of their produce they dispose of to the Missions." P. 26: "The natives may buy back anything they may have sold to the mission and at the same price they received for it."

The skins are secured by the natives in the following manner. From the end of October until the beginning of April when the coat of hair is "prime" the natives place out a rather large number of well-baited traps, which are looked over daily or weekly according to the extent of the trap-line and the weather. The best time is said to be the end of December and January. Summer skins have no value at all, autumn and late spring skins only a very small value. The trapper has to put long distances behind him often in vain; then a fox will be caught but another beast of prey (wolverines are blamed in particular) or perhaps another fox has eaten the helpless fox, and destroyed the skin; at other times no fox or other fur-bearing animal, but a falcon or snowy owl has been caught, or the trap has been pulled away and lost. So trapping remains ever an uncertain calling, which demands much skill and hard work. A man's industry is judged according to the number of fox-skins secured during the winter. The captured animals are killed if necessary, then taken from the trap carefully, and the traps set again. They skin the animals at home by making an incision on the inside of the hind legs, also turning tail, ears and feet completely inside out. Then they scrape the skin carefully until it is clean, stretch it on a board for a few days until it is somewhat dried—quick drying in too great heat may injure the skin [P. 253] and cause the hairs to fall out in the later dressing. Finally they turn the skin right side out and hang it up by the nose for complete drying. It is easily understood, that this work is not too easy in the cramped, dark Eskimo houses, and also not conducive to the improvement of the air, already filled with odours. Luckily there are no moths nor other harmful pests in those districts which would injure the fur.

(*To be continued*)

AN ANNOTATED LIST OF VASCULAR PLANTS COLLECTED ON THE NORTH SHORE OF THE GULF OF ST. LAWRENCE, 1927-1930

By HARRISON F. LEWIS

(*Continued from page 228, Vol. XLV*)

MYRICACEÆ

Myrica Gale L.

Watshishu, June 8, 1927, damp, mossy hollow on granitic island. Kegaska River (mouth) June 10, 1927, top of sandy bank on mainland near shore. Wapitagun, June 17, 1927, damp bog hollow. At Natashquan this species in 1928 was observed in bloom at least as early as May 18.

BETULACEÆ

Betula papyrifera Marsh.

Seven Islands, September 7, 1928, face of steep wooded bank of sand and clay. Betchewun, August 25, 1928, old tree in dense woods, chiefly coniferous. Recorded by St. John as *Betula alba* L.

Betula papyrifera Marsh., f. *occidentalis* (Hook.) Fernald.

Net Island, July 4, 1927, precipitous south side of island, at about 100 feet elevation. Recorded by St. John as *B. alba* L., f. *occidentalis* (Hook.) Fernald.

Betula papyrifera Marsh., var. *cordifolia* (Regel) Fernald.

Sholiaban, July 23, 1928, in wooded hollow. La Tabatière, July 21, 1928, in woods that were chiefly coniferous. Recorded by St. John as *B. alba* L., var. *cordifolia* (Regel) Fernald.

Betula glandulosa Michx. x. *B. papyrifera* Marsh. (*B. microphylla* Bunge).

Eskimo Island, August 28, 1928, sunny slope. Bradore Bay, June 30, 1927, wooded thicket on pre-Cambrian formation at head of bay. Blanc Sablon, July 10, 1928, prostrate on sandy hillside, west side of river. Recorded by St. John as *B. microphylla* Bunge.

**Betula papyrifera* Marsh. x. *B. pumila* L. (*B. borealis* Spach).

Ste. Genevieve Island, August 23, 1928, steep bank just above beach.

Betula Michauxii Spach.

Kegaska River (mouth), June 23, 1928, open tundra. Harrington Harbour, July 5, 1928, damp, broad, mossy ledge.

Betula pumila L.

Ste. Genevieve Island, August 23, 1928, steep bank just above shore. The Bluff Harbour, June 14, 1927, shallow turf on granite island. Wapitagun Island, August 6, 1928, prostrate on tundra, partially erect where sheltered. Harrington Harbour, June 20, 1927, boggy turf on granite, and July 5, 1928, damp, broad, mossy ledge. Aylmer Sound, August 18, 1927, thicket on Little Mecatina Island. Dukes Island, July 7, 1928, tundra. Rocky Bay, June 24, 1927. Bradore Bay, June 28, 1927, damp earth among low fir and spruce on calcareous sandstone. Blanc Sablon, July 10, 1928, sandy hillside, west side of river.

**Betula pumila* L., var. *renifolia* Fernald.

Mutton Bay, July 27, 1929, hillside east of the harbour. The type locality. Described and recorded from Mutton Bay by M. L. Fernald (1926).

Betula glandulosa Michx.

Mascanin, August 20, 1928, wet muskeg beside small stream. Rocky Bay, July 17, 1928, boggy rivulet-side. Bradore Bay, June 28, 1927, wet, boggy hilltop on calcareous sandstone. Blanc Sablon, July 10, 1928, sandy hillside, west side of river.

Alnus crispa (Ait.) Pursh, var. *mollis* Fernald.

Kegaska River (mouth), June 10, 1927, wooded top of sandy bank. Rocky Bay, June 24, 1927, rocky hillside. Blanc Sablon, June 28, 1927, sandy bank of brook, on calcareous sandstone, west side of river.

Alnus incana (L.) Moench, var. *glauca* Ait.

Natashquan, May 24, 1928, damp depression and August 17, 1928, border of damp slough and August 18, 1928, border of wet hollow in sandy woods. Shedding pollen at Natashquan on May 15, 1928.

URTICACEÆ

Urtica gracilis Ait.

Seven Islands, September 3, 1928, beside wooden side-walk of principal street.

Urtica viridis Rydb.

Fog Island, August 2, 1927, turfy slope. Blanc Sablon, July 11, 1928, turf on gneiss plain. Recorded by St. John as *U. Lyallii* Wats.

SANTALACEÆ

Comandra Richardsiana Fernald.

Betchewun, August 25, 1928, open grassland near coniferous woods.

Geocaulon lividum (Richards.) Fernald.

Natashquan, August 5, 1927, open, sandy woods. La Tabatière, July 7, 1927, mossy border of woods. Bradore Bay, June 30, 1927, mossy slope on calcareous sandstone near head of bay. Recorded by St. John as *Comandra livida* Richardson.

POLYGONACEÆ

Rumex occidentalis Wats.

Bonne Esperance, August 22, 1927, hillside near fishing establishment.

Rumex Britannica L.

Natashquan, August 7, 1927, border of fresh marsh.

Rumex mexicanus Meisn.

Kegaska, August 12, 1927, sandy dooryard. Harrington Harbour, July 25, 1928, top of sandy beach on mainland. Recorded by St. John as occurring "eastward as far as Romaine". Range extension, 59 miles E.

RUMEX ACETOSELLA L.

St. Mary Islands, July 24, 1927, gravelly foot-path on western island. Blanc Sablon, August 26, 1927, sandy bank, mouth of Blanc Sablon River, east side of river.

Polygonum Fowleri Robinson.

Kegaska, August 12, 1927, sandy beach. Wapitagun, July 30, 1927, crevices in exposed rock near shore of outer islands.

POLYGONUM AVICULARE L.

Natashquan, August 9, 1927, sandy roadway.

Polygonum viviparum L.

Boat Islands, July 26, 1927, turfy hillside. St. Mary Islands, July 23, 1927, crevices in rock near shore of eastern island. Bradore Bay, July 13, 1928, turfy plain.

*POLYGONUM PERSICARIA L.

Magpie, September 1, 1928, damp hollow beside road. Observed at Thunder River also.

POLYGONUM CONVOLVULUS L.

Betchewun, August 25, 1928, gravelly shore. Natashquan, September 8, 1927, sandy churchyard.

CHENOPODIACEÆ

CHENOPODIUM ALBUM L.

Matamek River (mouth), September 5, 1928, dooryard. Harrington Harbour, September 1, 1927, rubbish heap.

Atriplex patula L.

Mascanin, August 20, 1928, gravel and decayed seaweed, just above shore of granitic island.

Atriplex glabriuscula Edmonston.

Aylmer Sound, August 18, 1927, top of sandy

beach on Little Mecatina Island. Blanc Sablon, July 11, 1928, rotting seaweed at top of beach of cove, east side of river. Recorded by St. John as *A. patula* var. *hastata* (L.) Gray.

Salicornia europaea L.

The Bluff Harbour, August 1, 1927, salt marsh on big island. Also observed as common in salt marsh at Mascanin, and seen at St. Charles Island and mouth of Matamek River. St. John says, "Known only from Seven Islands". Range extension, 258 miles E.

**Suaeda Richii* Fernald.

St. Charles Island, August 27, 1928, limestone shingle beach of sheltered cove.

CARYOPHYLLACEÆ

Spergularia canadensis (Pers.) Don.

The Bluff Harbour, August 1, 1927, salt marsh on big island.

Sagina nodosa (L.) Fenzl.

Mingan, August 31, 1928, brackish sand flat. Natashquan, August 5, 1927, damp sand flat. Kegaska, August 15, 1928, crevice in granitic rock near shore of Kegaska Island. Wolf Bay, August 13, 1927, brackish sand flat beside shore. La Tabatière, July 21, 1928, narrow cracks in granitic rock at shore.

Arenaria lateriflora L., var. *typica* (Regel) St. John.

Lake Island, July 18, 1927, turf just above shore line. Wapitagun, July 30, 1927, peaty hummock among low herbage. St. Mary Islands, July 22, 1927, sandy strip above rock beach, on middle island.

Arenaria peploides L., var. *diffusa* Hornem.

Dukes Island, July 7, 1928, gravelly beach. Anse des Dunes, July 12, 1928, sandy beach, in a position just below the beach grass (*Ammophila*), about 12 feet above the lowest land vegetation.

Arenaria peploides L., var. *robusta* Fernald.

Kegaska, August 14, 1928, sand beach. Harrington Harbour, July 25, 1928, top of sand beach on mainland. Bradore Bay, June 29, 1927, sand beach at lower margin of grass (*Elymus*).

**Arenaria peploides* L., var. *maxima* Fernald.

Anse des Dunes, July 12, 1928, the lowest land vegetation on a sandy beach.

**Arenaria verna* L., var. *pubescens* (Cham. & Schl.) Fernald.

Greenly Island, July 12, 1928, sandstone crag.

Arenaria grœnlandica (Retz.) Spreng.

Lake Island, July 29, 1927, shallow gravel and lichen mats on rock summit. Rocky Bay, July 17, 1928, granitic crests of hills, about 400 feet high.

Stellaria calycantha (Ledeb.) Bongard.

La Tabatière, July 7, 1927, grassy slope. Dukes Island, July 7, 1928, upper part of gravelly beach. Rocky Bay, July 18, 1928, moss on low ground near Rocky Bay River. Recorded by St. John as *Stellaria borealis* Bigel.

Stellaria crassifolia Ehrh.

Rock near Fog Island, August 9, 1928, damp depression.

Stellaria humifusa Rottb.

The Bluff Harbour, August 1, 1927, salt marsh on big island. Lake Island, August 7, 1928, crevice in granitic rock at shore of cove. Mainland west of Net Island, Old Fort Archipelago, July 5, 1927, saline shore of sand and granite.

Stellaria longipes Goldie.

Ste. Genevieve Island, August 23, 1928, top of limestone shingle beach. Natashquan, June 27, 1928, sandy turf. St. Mary Islands, July 22, 1927, sandy beach above rock shore of middle island. Bradore Bay, June 28, 1927, damp turf on calcareous sandstone.

STELLARIA MEDIA (L.) Cyrill.

Natashquan, August 7, 1927, brackish marsh beside Little Natashquan River. St. Augustin Island, July 19, 1928, damp, rich earth near old chimney.

**Cerastium arvense* L.

Betchewun, August 25, 1928, turfy slope near shore of Gun Island. Given in St. John's list as hypothetical.

Cerastium Beeringianum Cham. & Schl.

Wolf Bay, June 18, 1928, shallow turf on granitic island. St. Augustin, June 22, 1927, island in the group called St. Augustin Square. Greenly Island, June 29, 1927, turfy hillside on calcareous sandstone, and July 12, 1928, sandstone crag.

**Cerastium alpinum* L., var. *lanatum* (Lam.) Hegetschw.

Net Island, July 4, 1927, precipitous southern face of the island, at about 100 feet elevation.

Silene acaulis L., var. *exscapa* (All.) DC.

Boat Islands, June 28, 1929, on surface of granitic rock. Mutton Bay, July 9, 1927, weathered rocky crest, at about 100 feet elevation. Salmon Bay, July 1, 1927, crevice on granitic headland. Recorded by St. John "from île Tête à la Baleine east to the strait of Belle Isle". Range extension, 34 miles W.

PORTULACACEÆ

Montia lamprosperma Cham.

Wapitagun, July 30, 1927, crevices in exposed rock near shore of outer islands. Harrington Harbour, July 25, 1928, rocky point of mainland. Whale Head, July 10, 1927, among sedges in

low, wet hollow at Jas. Mauger's harbour. Rocky Bay, July 18, 1928, gravel shore near mouth of Rocky Bay River.

NYMPHÆACEÆ

Nymphozanthus variegatus (Engelm.) Fernald.

Lake Island, July 29, 1927, in 6 inches of water in small pond.

RANUNCULACEÆ

Ranunculus aquatilis L., var. *capillaceus* DC.

Bradore Bay, August 27, 1927, in 1 foot of water in slow-flowing brook on calcareous sandstone.

Ranunculus Cymbalaria Pursh.

Pointe au Maurier, July 13, 1927, on a small island.

Ranunculus hyperboreus Rottb.

Boat Islands, July 27, 1927, small pool in rock.

Ranunculus reptans L.

Natashquan, August 5, 1927, damp pond margin, and August 18, 1928, matted on dried-up pond bed. Kegaska, September 4, 1927, bank of slow-flowing brook.

Ranunculus abortivus L.

Blanc Sablon, July 11, 1928, turf near houses, east side of river.

Ranunculus pennsylvanicus L.

Thunder River, September 2, 1928, rich swale. La Tabatière, July 21, 1928, turf beside path. Observed also at Seven Islands.

RANUNCULUS ACRIS L., var. STEVENI (Andrz.) Lange.

Magpie, September 1, 1928, sodded, pastured roadside. Natashquan, August 17, 1928, grassy roadside. St. Mary Islands, July 25, 1927, turf near boathouse on western island.

**Thalictrum alpinum* L.

St. Charles Island, August 27, 1928, talus at foot of shore cliff. Given as hypothetical by St. John, following a report by D. N. Saint-Cyr of its occurrence on this island.

Thalictrum confine Fernald.

Seven Islands, September 12, 1928, widely distributed over raised boulder beach above gravel shore on Manowin Island. Betchewun, August 25, 1928, open slope of Gun Island (not wooded). Mascanin, June 20, 1929, fresh upper border of salt marsh. Kegaska, August 10, 1929, top of beach on Kegaska Island. Recorded by St. John from region of Mingan Islands only. Range extension, 98 miles W. and 79 miles E.

Thalictrum polygamum Muhl.

Thunder River, September 2, 1928, rich river bank. Kegaska River (mouth), August 3, 1927, sandy bank. Etamamu River (island near mouth of), July 20, 1927, damp hollow on granitic rocks near shore. Blanc Sablon, July 11, 1928, damp shore of river, west side of river.

**Anemone parviflora* Michx.

St. Charles Island, August 27, 1928, limestone talus at foot of shore cliff. Given as hypothetical by St. John.

Caltha palustris L.

Betchewun, June 3, 1928, marshy brook. Blanc Sablon, July 11, 1928, wet brookside. Seen also at Seven Islands.

Coptis grœnlandica (Oeder) Fernald.

Harrington Harbour, June 20, 1927, open, grassy marsh, about 2 feet above high tide. Bradore Bay, June 28, 1927, wet, gravelly hillside on calcareous sandstone. Recorded by St. John as *Coptis trifolia* (L.) Salisb.

Actæa rubra Willd.

Betchewun, August 25, 1928, border of woods on Wood Island. Kegaska, June 23, 1928, border of woods near houses. Mutton Bay, July 9, 1927, basaltic dyke ravine. Blanc Sablon, July 11, 1928, wet slope of steep bank, east side of river.

Actæa rubra Willd., f. *neglecta* (Gillm.) Robinson.

Kegaska, August 15, 1928, thicket back of mussel-shell beach on Kegaska Island. Recorded by St. John only from region of Mingan Islands. Range extension, 79 miles E.

CRUCIFERÆ

Draba incana L.

Betchewun, June 5, 1927, limestone boulder. Whale Head, July 10, 1927, turfy dooryard near Jas. Mauger's harbour. Bradore Bay, June 29, 1927, grassy crest of sand beach.

Draba incana L., var. *confusa* (Ehrh.) Poir.

Kegaska, August 14, 1928, dry, broken mussel-shell above beach on Green Island. Wolf Bay, July 31, 1927, turfy slope of island called "The Black Land". Wapitagun, July 14, 1927, turfy crest of rock knob on Matchiatik Island. Pointe au Maurier, July 13, 1927, mussel-shell beach near tide mark.

Draba arabisans Michx., var. *orthocarpa* Fernald & Knowlton.

Kegaska, June 23, 1928, mussel-shell detritus near shore. Wolf Bay, June 18, 1928, shallow turf on rocky point of island called "The Black Land". Net Island, July 4, 1927, precipitous southern face of island, at an elevation of about 250 feet. Bradore Bay, June 28, 1927, crest of sandy beach in area of calcareous sandstone. Anse des Dunes, July 12, 1928, grassy area above beach. Recorded by St. John as far east as "Archipel Ouapitagone: Romaine" only. Range extension, 178 miles E.

**Draba hirta* L.

Wolf Bay, July 31, 1927, rocky crest on island called "The Black Land".

THLASPI ARVENSE L.

Wolf Bay, August 13, 1927, dooryard at head of bay. Harrington Harbour, September 1, 1927, rubbish heap. St. Augustin Island, July 19, 1928, damp, rich earth near old chimney.

Subularia aquatica L.

Kegaska, September 4, 1927, in 2 feet of water in slow-flowing brook.

CAPSELLA BURSA-PASTORIS (L.) Medic.

Natashquan, August 5, 1927, sandy road. Bradore Bay, June 30, 1927, damp dooryard at head of bay.

*NESLIA PANICULATA (L.) Desv.

Harrington Harbour, September 1, 1927, rubbish heap.

Cakile edentula (Bigel.) Hook.

Natashquan, August 5, 1927, loose sand between dunes and shore. Harrington Harbour, July 25, 1928, sandy sea beach on mainland. Anse des Dunes, August 26, 1927, top of sandy beach. Recorded by St. John as far east as "Rivière Netagamiou" only. Range extension, 124 miles E.

*BRASSICA JUNCEA (L.) Cosson.

Harrington Harbour, September 1, 1927, rubbish heap.

Cochlearia cyclocarpa S. F. Blake.

Ste. Genevieve Island, August 23, 1928, top of limestone shingle beach. Watshishu, May 26, 1928, in flower in crevices and on edges of shallow turf, on granitic islands. Pointe au Maurier, July 13, 1927, on small island. Lourdes de Blanc Sablon, June 29, 1927, cracks in gneiss near shore.

Cochlearia tridactylites Banks.

Betchewun, June 6, 1927, grassy, open area on limestone on Gun Island.

Rorippa palustris (L.) Bess., var. *hispida* (Desv.) Rydb.

Fog Island, August 2, 1927, turfy slope, and August 9, 1928, along rivulet. Harrington Harbour, July 25, 1928, iron-soaked sand at top of beach of mainland. Recorded by St. John as *Radicula palustris* (L.) Moench, var. *hispida* (Desv.) Robinson.

Barbarea orthoceras Ledeb.

La Tabatière, July 21, 1928, damp soil near shore. Blanc Sablon, July 11, 1928, wet slope of steep bank, east side of river.

**Cardamine pratensis* L.

St. Mary Islands, July 27, 1927, wet, mossy swale on "Puffin" Island, a small island west of Cliff Island. Given as hypothetical by St. John.

Cardamine pennsylvanica Muhl.

Wolf Bay, August 13, 1927, dooryard at head of bay. La Tabatière, July 21, 1928, wet, shaded humus soil. Reported by St. John from Blanc Sablon only. Range extension, 153 miles W.

Arabis alpina L.

Blanc Sablon, June 28, 1927, cold, mossy, springy slope on calcareous sandstone, west side of river. Greenly Island, July 6, 1930, damp earth among boulders.

Arabis Drummondi Gray.

Blanc Sablon, July 20, 1929, bank of small stream, west side of river. Collected by E. C. Abbe.

SARRACENIACEÆ

Sarracenia purpurea L.

Natashquan, August 6, 1927, sphagnum bog. Generally common.

DROSERACEÆ

Drosera rotundifolia L.

Natashquan, August 9, 1927, damp hollow among sand dunes. Generally abundant.

Drosera anglica Huds.

Baie Johan Beetz, August 22, 1928, wet sphagnum near shore. Natashquan, August 6, 1927, boggy, open valley. Kegaska River, August 15, 1928, wet muskeg. Pointe au Maurier, July 13, 1927, wet sphagnum on rock near shore.

CRASSULACEÆ

Sedum villosum L.

On an outer island about 3 miles west of Cape Mecatina, July 23, 1928, in moss at edge of vegetation. St. Augustin, July 19, 1928, shallow, wet moss and turf on granitic island in the group of islands called St. Augustin Square. These two stations are about 42 miles apart. Those reported by St. John, namely, "Archipel de Kécarpoui: îles Affligées, and île Kécarpoui", lie between them. The species was observed also on an island lying about 5 miles west of St. Augustin Island, which is likewise between the extremes given above.

Sedum roseum (L.) Scop.

Ste. Genevieve Island, June 7, 1927, limestone rocks at top of beach. St. Augustin Island, June 23, 1927. Blanc Sablon, June 28, 1927, very shallow turf on granitic rock near river.

SAXIFRAGACEÆ

Saxifraga cæspitosa L.

Whale Head, July 10, 1927, crevices in granite cliff on island at Jas. Mauger's harbour. St. Augustin, July 19, 1928, damp rock on granitic island in the group of islands called St. Augustin Square.

Saxifraga Aizoon Jacq.

Mutton Bay, July 9, 1927, weathered rocky crest, at elevation of about 150 feet.

Saxifraga oppositifolia L.

Fright Island, June 4, 1927, turf resting on limestone on high, open bank. St. Charles Island, August 27, 1928, limestone talus at foot of shore cliff. Ste. Geneviève Island, June 7, 1927, limestone rocks at top of beach. Observed only among Mingan Islands.

Mitella nuda L.

Ste. Genevieve Island, August 23, 1928, shaded, mossy, coniferous woods.

Parnassia parviflora DC.

Kegaska, August 14, 1928, turf near shore of Green Island. Fog Island, August 2, 1927, and August 9, 1928, turfy slope. Observed also near outer shore of Kegaska Island, at Kegaska. Recorded by St. John only from region of Mingan Islands. Range extension, 113 miles E.

Parnassia Kotzebuei Cham. & Schl.

Blanc Sablon, July 11, 1928, wet slope of steep bank, east side of river.

Ribes hirtellum Michx.

Natashquan, June 27, 1928, turfy roadside. Wolf Bay, July 31, 1927, foot of bank on island called "The Black Land".

Ribes hirtellum Michx., var. *calcicola* Fernald.

Ste. Genevieve Island, August 23, 1928, top of limestone shingle beach. Kegaska, August 14, 1928, fringing vegetation near shore of Green Island. Recorded by St. John from Mingan Islands only. Range extension, 80 miles E.

Ribes lacustre Poir.

Betchewun, August 26, 1928, border of woods. La Tabatière, July 21, 1928, shady coniferous woods. Blanc Sablon, August 26, 1927, wooded hollow near falls of Blanc Sablon River, west side of river. Observed also on Kegaska Island. Recorded definitely by St. John only from Mingan Islands. Range extension, 285 miles E.

Ribes prostratum L'Hér.

Betchewun, June 5, 1927, open limestone areas near shore. Kegaska River, June 10, 1927, wooded top of sandy bank. Harrington Harbour, June 20, 1927, brushy ravine. Bradore Bay, June 28, 1927, damp earth among low fir and spruce plants on calcareous sandstone.

Ribes triste Pall.

Betchewun, August 25, 1928, thicket just within border of woods on Wood Island.

Ribes triste Pall., var. *albinervium* (Michx.) Fernald.

Blanc Sablon, July 11, 1928, foot of steep bank, east side of river.

ROSACEÆ

Spiræa latifolia Borkh., var. *septentrionalis* Fernald.

Mingan, August 30, 1928, sand flat beside Mingan River. Natashquan, August 5, 1927, pond margin. Also observed at Kegaska, beside slow-flowing stream, which is 24 miles east of Natashquan, the easternmost point from which it is recorded by St. John.

Aronia arbutifolia (L.) Ell., var. *atropurpurea* (Britt.) Schneid.

Baie Johan Beetz, August 22, 1928, thin, scanty soil on granite hillside. Mascanin, August 20, 1928, about 6 inches high at edge of vegetation bordering bare granite exposure on hillside. Recorded by St. John as *Pyrus arbutifolia* (L.) L.f., var. *atropurpurea* (Britton) Robinson.

Sorbus americana Marsh.

Lake Island, July 29, 1927, wooded bank. La Tabatière, July 21, 1928, in woods that were chiefly coniferous. Recorded by St. John as *Pyrus americana* (Marsh.) DC.

Amelanchier Bartramiana (Tausch.) Roemer.

Magpie, September 1, 1928, rocky bank near mouth of Magpie River, Mutton Bay, July 9, 1927, wooded hollow. Bradore Bay, June 30, 1927, wooded thicket on granitic rocks near head of bay. Blanc Sablon, July 11, 1928, hollow in tundra near lake. In 1928 first found in bloom at Coacoacho on June 19.

Amelanchier sp.

A small collection from Manowin Island, Seven Islands, September 12, 1928, border of thicket at top of raised boulder beach, is markedly different from *Amelanchier Bartramiana*, as shown by its larger, sub-orbicular leaves, with small, distant, irregular and poorly defined teeth, occurring on the apical half of the margin only, and by the fact that the bark of its twigs is smoother, more glaucous and more translucent, with less conspicuous lenticels. Upon advice of Dr. K. M. Wiegand no attempt is made, pending receipt of additional material, to name this collection specifically.

Fragaria virginiana Duchesne.

Betchewun, June 5, 1927, grassy area near shore.

Fragaria virginiana Duchesne, var. *terræ-novæ* (Rydb.) Fernald & Wiegand.

Natashquan, June 27, 1928, sandy turf. Anse des Dunes, June 28, 1927, sandy bank of brook.

Potentilla norvegica L.

Kegaska, August 14, 1928, dry turf on Green Island. Recorded by St. John as *Potentilla monspeliensis* L., var. *norvegica* (L.) Rydb.

Potentilla norvegica L., var. *hirsuta* (Mx.) Lehm.

Matamek River (mouth of), September 5, 1928, sand beach. Yankee Harbour, July 28, 1927, turfy hollow. Pointe au Maurier, July

13, 1927, on small island. Recorded by St. John as *Potentilla monspeliensis* L.

**Potentilla maculata* Pourr.

Greenly Island, June 29, 1927, turf near dwellings, and July 12, 1928, grassy turf and mossy slope. This plant is well distributed on Greenly Island, especially on the northern half of the island. Not observed elsewhere.

Potentilla pectinata Raf.

Havre St. Pierre, August 28, 1928, dry limestone ledge beside shore.

Potentilla palustris (L.) Scop.

Lake Island, July 29, 1927, damp ground near shore. La Tabatière, July 21, 1928, damp, open ground near shore.

Potentilla palustris (L.) Scop., var. *parvifolia* (Raf.) Fernald & Long.

Wapitagun Island, August 6, 1928, in 4 inches of water in a pool near shore.

Potentilla fruticosa L.

Ste. Genevieve Island, August 23, 1928, damp hollow near shore. Blanc Sablon, August 26, 1927, wooded hollow beside falls of Blanc Sablon River, west side of river.

Potentilla tridentata Sol. apud Ait.

Lake Island, July 18, 1927, rocky top of cliff. Mutton Bay, July 9, 1927, rocky gravel crest. La Tabatière, July 7, 1927, gravelly hillside.

Potentilla Anserina L.

St. Mary Islands, July 22, 1927, top of beach on middle island.

Potentilla Anserina L., var. *sericea* Hayne.

Ste. Genevieve Island, August 23, 1928, top of limestone shingle beach.

Potentilla pacifica Howell.

La Tabatière, July 7, 1927, gravel at top of beach, and July 21, 1928, upper part of gravel beach. Bradore Bay, July 13, 1928, loose sand near shore.

Geum macrophyllum Willd.

Kegaska, August 10, 1929, turfy slope of Green Island. Blanc Sablon, July 11, 1928, wet slope of steep bank, east side of river.

Geum rivale L.

Kegaska, August 14, 1928, and August 10, 1929, turfy slope of Green Island. La Tabatière, July 21, 1928, turf near shore. Blanc Sablon, July 10, 1928, bushy hillside, west side of river.

Dryas integrifolia M. Vahl.

Ste. Genevieve Island, June 5, 1928, limestone shingle near beach.

**Dryas Drummondii* Richards.

Quarry Island, September 5, 1929, raised beach of limestone gravel.

Rubus idæus L., var. *canadensis* Richards.

Wolf Bay, July 31, 1927, foot of bank on the island called "The Black Land".

Rubus Chamæmorus L.

Wapitagun, June 17, 1927, shallow, damp turf. Harrington Harbour, June 20, 1927, damp, turfy slopes. Bradore Bay, June 30, 1927, bushy sphagnum bog near head of bay.

Rubus arcticus L.

Kegaska River, June 24, 1928, turfy slope of small island near mouth of river.

Rubus acaulis Michx.

St. Augustin, June 22, 1927, granitic outer island in the group called St. Augustin Square. Dukes Island, July 7, 1928, deep moss on upper part of sandy beach. Bradore Bay, June 28, 1927, damp turf on calcareous sandstone. Recorded by St. John as *R. arcticus* L., var. *grandiflorus* Ledeb.

Rubus pubescens Raf.

Lake Island, July 18, 1927, border of woods on tundra. Boat Islands, July 26, 1927, damp valley. Net Island, July 4, 1927, upper slopes of precipitous southern face of island, at an elevation of about 250 feet.

Alchemilla vulgaris L., var. *filicaulis* (Buser) Fernald & Wiegand.

Blanc Sablon, July 10, 1928, bushy hillside, west side of river.

Sanguisorba canadensis L., var. *latifolia* Hook.

Kegaska River, August 3, 1927, sandy bank.

**Rosa nitida* Willd.

Havre St. Pierre, September 11, 1929, border of field. Possibly introduced from the Magdalen Islands, whence the founders of Havre St. Pierre came. The old man who showed it to me, however, insisted that it was native where found, and said that he knew of another patch of it on Eskimo Island, near Havre St. Pierre.

Prunus pennsylvanica L.,

Seven Islands, September 12, 1928, forming thicket on raised boulder beach at foot of hill on Manowin Island. Betchewun, August 26, 1928, open woods.

(*To be continued*)

FIFTY-THIRD ANNUAL REPORT OF THE COUNCIL OF THE OTTAWA FIELD-NATURALISTS' CLUB

Annual Meeting, Thursday, December 10th, 1931, at the National Museum of Canada

1. MEETINGS.—During the past year four meetings of the Council were held, at the residences of Dr. R. E. DeLury, Mr. P. A. Taverner, Mr. Hoyes Lloyd, and Dr. Harrison F. Lewis, with an average attendance of 13 members.

2. EXCURSIONS.—The usual four excursions were held, as follows:

On May 2nd, in the vicinity of Lemieux Island, along the south shore of the Ottawa River Subject, Geology. Leader, Dr. F. J. Alcock.

On May 9th, at Rockcliffe Park, in the vicinity of McKay Lake. Subject, Amphibians and other Natural History. Leaders: Dr. R. M. Anderson, Mr. G. F. Miller, Mr. Herbert Groh and Mr. Robert Lockwood.

On May 16th, at Fairy Lake, Quebec. Subject, Birds and other Natural History. Leaders: Mr. Hoyes Lloyd, Dr. R. E. DeLury, Mr. G. A. Miller, Dr. R. M. Anderson Mr. Herbert Groh, Mr. C. E. Johnson and Mr. A. G. Kingston.

On May 30th, at Britannia-on-the-Bay. Subject, Botany and other Natural History. Leaders: Mr. Herbert Groh, Mr. G. A. Miller, Dr. R.M. Anderson, Miss M. E. Cowan, Mr. Robert Lockwood and Mr. A. G. Kingston.

The average attendance was about 60.

3. PUBLICATIONS COMMITTEE.—Mr. Hoyes Lloyd, Chairman, submits the following report "*The Canadian Field-Naturalist* has been issued on time and has contained a wealth of material of interest to naturalists in many branches of science. Our publishers and the editors are congratulated on the completion of this impotant volume. Those who are completing sets are advised to speed up their activities, as many numbers are becoming increasingly difficult to supply. Good runs are available for many periods of the Club's existence, and we may have just the numbers needed."

4. BIRD CENSUS.—The annual Christmas Bird Census of the Ottawa area was taken on December 21st, 1930, by twenty observers, following nine established routes Dr R. E. DeLury, Chairman of the Census Committee, gives the total number of individual birds as over 2,600, and the total of species as 31.

5. LEGACIES AND GIFTS.—The Council acknowledges with deep gratitude the bequest of Five Hundred Dollars made to the Club by the will of the late Mr. J. H. Emerton, of Boston, Mass., U.S.A., for many years a member of the Club. The Council also wishes to express its thankful appreciation of the generosity of Mrs. H. M. Ami in donating to the Club lantern slides, documents relating to the early history of the Club, back numbers of *The Canadian Field-Naturalist*, and a Natural History scrap-book covering the years 1899, 1900 and 1901, which had been the property of her late husband Dr. Ami, for many years a distinguished member and a Past President of the Club. These are all very valuable additions to the assets of the Club.

6. PATRON.—His Excellency, the Earl of Bessborough, Governor-General, following the example of his predecessors, has been graciously pleased to accept the office of Patron of the Club.

7. BRITISH COLUMBIA BIRD AND MAMMAL SOCIETY.—This recently-formed Society has selected *The Canadian Field-Naturalist* as its official organ.

8. ROYAL SOCIETY OF CANADA.—Dr. E. M. Kindle attended the annual meeting of the Royal Society of Canada, which was held at Toronto in May, 1931, as the representative of the Club.

9. GOOD AND WELFARE.—In retiring from office your Council feel that, in view of the acute financial depression which has been affecting all spheres of activity, the Club's record of the past year has been a creditable one. There is, however, much room for expansion in membership and activities, and the Council calls on all members to do their utmost in advancing the interest of the Club during the coming year. To the incoming executive and Council we wish every success on the Club's entering on the fifty-fourth year of its existence

HARRISON F. LEWIS, *President.*

GORDON S. POSTLETHWAITE, *Secretary.*

STATEMENT OF THE FINANCIAL STANDING OF THE OTTAWA FIELD-NATURALISTS' CLUB

At the Close of the Year 1930-1931

ASSETS		LIABILITIES	
Balance in Bank, November 28, 1931..	$110.65	NIL	
Government Bond.....	500.00		
Bills receivable.....	19.42	Balance.....	$630.07
	$630.07		$630.07

RECEIPTS		DISBURSEMENTS	
Balance, November 28, 1930.....	$426.86	Printing and Mailing "Naturalist"....	$1,276.95
Membership, Current.....	1,023.20	Editor.....	90.00
Membership, Advance, etc.....	51.05	Postage.....	44.42
Advertisements.....	76.45	Bank discount.....	20.85
Back numbers.....	37.00	Separates and Illustrations.....	243.89
Separates and Illustrations.....	170.00	Miscellaneous.....	4.25
Miscellaneous.....	35.54	Dominion of Canada Conversion Loan Bond.....	529.09
Emerton bequest.....	500.00	Balance in Bank, November 28, 1931	$110.65
	$2,320.10		$2,320.10

WILMOT LLOYD,
Treasurer

HARRISON F. LEWIS,
A. G. KINGSTON,
Auditors

STATEMENT — RESERVE FUND

ASSETS		LIABILITIES	
Government Bonds.....	$1,200.00	NIL	
Balance in Bank.....	132.72	Balance.....	$1,332.72
	$1,332.72		$1,332.72

RECEIPTS		DISBURSEMENTS	
Balance in Bank.....	$220.57	Purchase of Bond.....	$208.63
Interest, Bank.....	6.20	Balance in Bank.....	132.72
Interest, Bonds.....	61.88		
Sale of Bond.....	52.70		
	$341.35		$341.35

WILMOT LLOYD,
Treasurer
W. T. MACOUN,
Chairman

HARRISON F. LEWIS,
A. G. KINGSTON,
Auditors

NOTES AND OBSERVATIONS

BASS GUARDING NEST KILLS INTRUDER.—It is generally known that the male Small-mouthed Black Bass guards its nest for some time after the deposition of the eggs, driving away other fishes which come too close to the vicinity of the nest, but the killing of an intruding fish may not have been often observed. I had the good fortune to make such an observation and believing that a record of it would be of some interest I have described the occurrence as I saw it.

This observation was made on June 13, 1926, in a pool in the Saugeen River near the town of Walkerton, Ontario. The nest, which I had had under observation for some time previous to the date of the occurrence described here, was situated in a depression on a sort of shelf along the river bank. This shelf was of clay covered with fine stones and gravel. The water on this shelf was about two feet in depth, but beyond it in the river itself the depth was about eight feet. The depression on the shelf in which the nest was situated was separated from the deeper water of the main channel by a ridge of clay.

On the day in question I sat for some time on the river bank watching the bass hovering over his nest. After a time I caught sight of a red horse (*Moxostoma*) slowly approaching the site of the nest. The Red Horse was about eighteen inches in length and two and one-half pounds in weight, the bass was about twelve inches long. When the Red Horse had come within about fifteen feet of the nest the bass moved slowly towards it, and the Red Horse swam slowly into deep water. In about two minutes the Red Horse again came upstream and again the bass drove it away. The same thing was repeated four or five times in fairly quick succession.

I was curious to see what would happen if the bass were absent from the nest. Accordingly I threw small pebbles into the water near the spot where the bass was lying. In a few minutes the bass became suspicious and slowly moved out into deep water. No sooner had the bass abandoned his spawn than the Red Horse again came upstream. Not seeing the bass the intruder gradually approached nearer and nearer to the nest. Finally, it swam straight towards the nest and began to devour the eggs. For a moment I felt disposed to frighten the intruder away, but contented myself with hoping for the return of the bass.

Soon the bass did return from deep water, very slowly at first, but when it was within thirty feet of the Red Horse it shot towards it like a dart. When about two feet away it wheeled round and shot under the Red Horse. As the bass wheeled round, the Red Horse made a dart for the deep water. Then the bass remained motionless on his nest as before.

The movement of the Red Horse did not appear normal. He kept very near the surface and when he reached midstream (the river is about seventy-five yards wide at this point) he came up to the surface fo the water with his white belly showing, and began to drift helplessly downstream. I was able to catch the fish farther downstream, and on examining it I discovered that the lateral and ventral portion of the abdominal wall on the right side had a large incision in it, at a distance midway between the pectoral and pelvic fins. The peritoneum was also torn open and the intestines hung out from the body. The fish was bleeding profusely from its wound, but was not dead when taken out of the water.

When I returned to the scene of action the faithful bass, with his deadly spines spread and standing erect, was diligently guarding his precious remaining spawn.—H. L. YACK.

A GREATER REDPOLL AT TORONTO.—On February 17, 1930, at Mount Denis, near Toronto, a flock of twelve redpolls was examined and a specimen secured by the writer which was noticeably larger than the others. The plumage was darker and the bill heavier and more wedge-shaped than the common redpoll. These indications suggested a Greater Redpoll (*Acanthis linaria rostrata*) and Mr. J. H. Fleming has kindly identified it as such. The measurements of the bird, which is a male, are as follows: Length, 146 mm.; wing, 79 mm.; bill, 10 mm. and wing expanse, 226 mm.

The Greater Redpoll, I believe, is of rare occurrence at Toronto. Mr. J. H. Fleming (*Auk*, 24: 79, 1907) says "Occurs among flocks of *linaria* but is rare; I have seen about a dozen well-marked local specimens taken between November 9 and February 10". There is a specimen in the Royal Ontario Museum of Zoology taken at Toronto on March 14, 1890, by Mr. James R. Thurston, which is evidently the latest record.—CLIFFORD E. HOPE.

ALBINO GRACKLES.—On July 22, 1930, the writer, and Mr. J. L. Baillie Jr., saw an albino Bronzed Grackle in a flock of about twenty-five normal individuals of this species in a field on the bank of the River St. Lawrence about five miles east of Kingston, Ontario. The bird was entirely white, or dusty pale gray. On July 24, (when Mr. Baillie unfortunately was not with us)

two or three white or white-marked individuals were seen at the same place in a flock of about one hundred Bronzed Grackles and a few Red-winged Blackbirds. One of these was apparently the same individual as had been seen on July 22, and was again noted as entirely white or dusty pale gray but this time it appeared to be tinged with cream-colour on and near the head. Another Grackle was normal except for a broad white stripe, two or more feathers, in the tail, near but not exactly in the middle. What may have been a third albino individual or may have been the first back again was also seen for a moment on this day. It showed much white in wings and tail in flight. The first bird described above, (or possibly another all-white bird) was seen again on July 26, in a flock of Bronzed Grackles and Red-winged Blackbirds.—R. OWEN MERRIMAN.

CASPIAN TERN BREEDING ON LAKE ONTARIO.—Sight of adult Caspian Terns near Kingston, Ontario, during the breeding season in 1928 and 1929 gave some expectations of finding them breeding in the vicinity, and these expectations were fulfilled in 1930. On May 25, the writer, accompanied by Mr. and Mrs. Stuart L. Thompson, Miss Ida Merriman, Miss Mary Baker, and a boatman, visited Salmon Island, near Kingston, and saw two adult Caspian Terns among the seven hundred and fifty (estimated) Common Terns and three hundred (also estimatd) Ring-billed Gulls which were breeding there. The Common Terns and Ring-billed Gulls then had incomplete clutches of eggs. No eggs of the Caspian Tern were then noticed. On my next visit to the island, on July 8, 1930, three young were found, of which my field notes read "feet and heavy beaks bright orange." They were of different sizes, one being too small to band, while the largest was able to swim well and caught a small fish near our boat. The two larger were given bands No. A675606 and No. A675607. I was convinced at the time that these were three young Caspian Terns, and correspondence and conversation with friends who know the downy young of this species has strengthened this conviction. Three or more Caspian Terns were seen flying about the vicinity on this day, and the numbers of other species were estimated as: Common Tern, 600 or more; Ring-billed Gull, 300 or more. There were then many eggs of Common Terns, a few eggs of Ring-billed Gulls, and young of both species, from newly hatched to well-grown. A few young Common Terns were on the wing. On July 17, I paid a third visit to this colony, my last for the season, and found A675-607, with wing quills now about three-quarters of an inch in length. We tethered this bird under a drop trap, hoping to catch its parents for banding when they came to feed it. We (myself, Miss Merriman and Mr. R. G. H. Smails) watched from a blind from 11.30 a.m. to 3 p.m.: but, although the young bird was inspected by one or more adult Caspian Terns and (less closely) by one or more adult Common Terns, it was not fed during this time and was finally released by us. On this day we saw four adult Caspian Terns on and about the island and estimated the number of Common Tern adults at 200 and of Ring-billed Gull adults at 300 or more. Most of the young of both species were able to leave the island by swimming or flying when we landed, but returned when we were concealed, and there were some newly-hatched young of both species and some adults of both species were incubating.

Besides the young Caspian Terns, we banded a number of young Ring-billed Gulls and Common Terns on July 8 and July 17, and on the latter date we banded one adult Common Tern, A364802 which went under a drop trap to brood its eggs.—R. OWEN MERRIMAN.

STARLINGS BATHING IN WINTER.—About January 15, 1931, several people had a curious experience with Starlings at Ottawa, which they have asked me to record.

Mrs. John Geikie and Messrs. R. Frith, Stanley Johnson and Leo Renaud were at work in Mr. Frith's greenhouse, which is near the gate of Beechwood Cemetery. The temperature was between 0 F. and +10° F., but it was a bright day and the sun shone warmly. From within the greenhouse the greenhouse staff could see a flock of about fifty Starlings in nearby trees, and from this flock a number of the birds flew down to bathe in an open stream of spring water. When the birds, having flown up from their bath had perched in a tree close at hand, they were at once encased in ice. While in this predicament they could hop among the branches, but could not fly. Some of them fell from the tree and two were picked up by the men. One of these escaped almost immediately and hid itself in a crack in a stone wall, while the other was brought into a warm greenhouse. There it made itself at home among the flowers, being cared for during its stay by Mr. Felix Korsa who recognized the species as a bird he knew in the Ukraine. It was released the next morning. If it was not impressed by the vagaries of Ottawa's climate, it should have been.—HOYES LLOYD.

BOOK REVIEWS

THE BRITISH CARBONIFEROUS PRODUCTI—II. PRODUCTUS (*sensu stricto*); SEMIRETICULATUS AND LONGISPINUS GROUPS. *By Helen Marguerite Muir-Wood, M.Sc., Mon. Geol. Survey of Great Britain, Palæontology Vol. III, Pt. I, pp. 1-217, Pls. 1-12, Dec. 1928.*

In Middle Devonian times there appeared the first representatives of the spinose brachiopods which are included in the sub-family group called *Productinæ*. This spine studded concavo-convex brachiopod innovation of the Middle Devonian had few species in the early stages of its history but from these a considerable number of species had developed in late Devonian times. The great differentiation of this group took place in the Carboniferous period. Preceding the decline and subsequent extinction of the group at the end of the Permian, no less than twenty genera had appeared.

Miss Muir-Wood's monograph deals with the British Producti of the period during which they reached the zenith of their differentiation into many curious and bizarre species.

Evolution produced in shells of the Producti not only an "almost infinite variation in size, contour and form which cannot be parallelled in any other group of closely related genera" but also the largest brachiopod shell known, *Productus giganteus* with a shell nearly a foot in width. Other diminutive species like *P. nystianus* having a shell width of 5 mm. were among the by-products of these Carboniferous experiments in producing giant spinose brachiopods.

The Producti are dealt with under the following sub-titles: terminology, morphology, evolution and range, *Productus* (*sensu stricto*) and the *P. semireticulatus* groups, classification and description of species.

The reviewer has examined no systematic work during the year which offers so little to critcise and so much to praise as this. The plates are admirably executed and the volume is in every way a credit both to the author and the Geological Survey of Great Britain.

Palæontologists using this volume will find (published in Amer. Mag. of Nat. Hist., Ser. 10, Vol. 5, pp. 100-108, Jan. 1930) a very useful supplementary paper by Miss Muir-Wood which supplies a key to the several genera of British Productinæ.—E. M. KINDLE.

CHECK-LIST OF NORTH AMERICAN BIRDS, *Prepared by a Committee of the American Ornithologists' Union. Fourth Edition. Constituting the "Systema Avium" for North America, north of Mexico. Published by the American Ornithologists' Union, Lancaster, Pa., 1931. Price $4.00. Address: W. L. McAtee, 200 Cedar St., Cherrydale, Va.*

At last the new Check-list is out! Previous editions are dated 1886, 1895 and 1910. A book of constant reference to every working ornithologist, the copies of the last edition have been worn to rags in the twenty-one years of hard use and none have been available for replacement. Consequently the appearance of new, sound, modern copies is welcomed as the old, obsolete, dog-eared volumes with shaky backs, loose leaves and feather edges are put to well-earned rest on the "bibliography" shelves.

Its preparation by the Committee on Classification and Nomenclature under the active Chairmanship of Dr. Witmer Stone was a herculean task. As by agreement with other learned bodies it is to form the North American volume of a world wide *Systema Avium*, the old, obsolete system of classification based on 1886 ornithology and retained through the years for reasons of expediency rather than of science had to be brought up to date and into agreement with other presentations of modern science. This alone was a task of some magnitude. Many were the conflicting ideas of detail which it took not only exact knowledge but judgment and restraint to harmonize. Fortunately we had a committee with these attributes, as the present volume demonstrates.

The resultant re-shuffling of orders, families, etc., will be confusing and disturbing to many who were raised on the old sequence and know no other, but to those engaged in extralimital ornithology it will offer no great difficulty and will be a great relief. At least it can be accepted as approximately correct in the light of present knowledge and a necessary reorientation of our concepts that will probably remain usable for the next fifty years as the old one has served for the past forty-five. Should it so stand this test of time and use we can congrautlate the authors on work well done and feel that the throes of readjustment to the new scheme have not been useless.

But one goes over the pages of the volume with mixed feelings of approval and dissent qualified by appreciation of the difficulties encountered by the authors. After the first shock of the rearrangement of classification, appears the fact that the old A.O.U. numbers, while still present, are hopelessly mixed and out of numerical sequence. This, of course, is unavoidable unless the

items were all numbered anew, a process that would make confusion worse confounded in many egg collections and files. There is therefore appended a list of the old sequence with the pages on which they can be found in the new arrangement.

In running over the species a number of changes from the 1910 list will be noted. Some species have been eliminated, others added. Some species have been reduced to subspecfiic status and some subspecies raised to specific rank. Here and there new names appear as familiar ones have been dropped and older ones revived. On the whole though, to one who has followed the various supplements as they appeared in the *Auk*, the changes are not revolutionary and most of them are well-advised even if a bit disconcerting. Conservatism has been the rule and not the exception and we are informed that unless there was a majority of more than one in the committee of eight, no departure was made from the *status quo*. On the other hand it is well to remember that it is the work of a committee and probably nearly every decision has a dissenting minority. That all will be equally satisfied with the result cannot be hoped for; that even one working ornithologist will be entirely approving is doubtful; but that most ornithologists will accept it with only minor reservations as a good working compromise hypothesis is to be expected. All dissentients should immediateely get their data in order, ready for the improvement and correction of the next Check-list when it comes to preparation.

Should we go over the list carefully and pick out all the items and details that offend us we should each, doubtless, fill many pages with objections. On the other hand no two such lists of protest would be alike and perhaps few even remotely similar. But even in a world of varying personal opinion a reviewer must take some standpoint, even if it is personal and he the only one that occupies it. Disregarding the strictly ornithological details and looking at the form and presentation alone the outstanding shortcoming of the list to this writer lies in its omission of all specific headings to subspecific groups. For instance, the Song Sparrow is presented as some twenty-six individual subspecies with nothing but the repetition of the middle name to show that they are but fractional parts of a specific whole. Each of these divisions is treated and typed with as much formality and impressiveness as the full species that are not trinomially divided. This is a retrograde step from the last edition. Scientifically it is a misrepresentation of relationship, psychologically it exalts the subspecies to the importance of the species and practically it forces one to grasp the specific unit as a whole only by pieceing its isolated fragments together as if it were a picture puzzle. Of particular offence to this reviewer's eye are the references to extralimital forms of the species by the formula "Allied races occur in Mexico" (or wherever it may be). This seems loose and amateurish, raising unsatisfied curiosity without furnishing legitimate information. It will be necessary to search a library of reference to complete the specific picture. The sequence of allied subspecies might also well have been improved upon. An attempt was made to list them in order of their genetic importance, a hopeless task and one upon which no more than a guess can be made. Much better would it have been if they had been placed chronologically, in order of description. There could have been no serious question as to position and it would have given the systematist at a glance that which he most usually desires,—the relative priorities of the races.

The distributions are considerably more extended than those of previous lists, and, as would be expected with the amount of work done in the interim, on the whole, more satisfactory but still to the critical eye they leave something to be desired. Probably they are as near accurate as any compilation of such a vast subject can be. The Committee here took counsel of agreatnumber of active ornithologists in various parts of the country. This course is at once their weakness and their strength. No one person and no group of persons can possibly have all the factors of distribution of all the species of birds of this wide, diversified continent at their finger tips. No two persons can be equally well informed regarding individual species or localities and much of this abundant opinion has necessarily been conflicting. To adjudicate perfectly between many advisors would take the wisdom of Solomon and the patience of Job. That the Committee has succeeded as well as it has in this particular direction is perhaps a matter of congratulation rather than of criticism.

Following the main list of recognized species and subspecies is a "Hypothetical List" including those species that have been proposed for, or admitted to, the list at various times but are now omitted or removed through doubt of validity or occurrance. Reasons are given in each case.

A "Summary of Changes, Additions and Eliminations" in the present edition as compared with that of the third follows with explanatory notes where the changes have been radical.

Finally appears a "List of Fossil Birds of North America" by Dr. Alexander Wetmore filling about seventy pages, evidence of the remarkable activity in avian palæontology that has

occurred since the 1910 edition, in which the same list occupied only eighteen pages.

In make up, the book is on good white paper, thin yet substantial and giving promise of permanence. The type is clear and clean and this most exacting type of proof reading seems to have been excellently performed. It is well and strongly bound, firm but opening well, as befits a work that has to stand hard usage, in good cloth of a dark blue colour and pebbled surface that will stand abrasion and will not show dirt or grime. With all its virtues, which are many, and its faults which are not to be disregarded, it is a work that no American ornithologist can be without and for better or worse it will be standard for some years to come.—P.A.T.

THE HUNTING OF THE BUFFALO *by E. Douglas Branch, Author of "The Cowboy and His Interpreters"; D. Appleton & Company, New York and London, 1929.*

In his preface, the author of this book thus states its purpose:—"The range of the buffalo . . . enveloped nearly two-fifths of the entire area of North America. The restriction of this range, gradual, then suddenly ruthless; the coming of new peoples who hunted; the ways, the tools, the laws of the hunt: that is the meat of this narrative. . . . The history of the buffalo hunt is almost as scattered as the buffalo bones left to molder on the prairies. I have tried to do a decent job of picking up the pieces." This aim has been accomplished. A vivid narrative, with plenty of picturesque detail, is the story of the white man's contact with the American Bison, from 1521, (when he first met the species, far out of its native range, in the Aztec Emperor's zoo,) to 1926. The influence of the Bison on Indian culture, both before and after their acquisition of the horse, and the use of the Bison as food by white men, first by the fur brigades, (of major importance in the history of the species in Canada,) and later by the railroad construction gangs, are both discussed, and the sport of buffalo hunting and the brief industry of gathering buffalo bones are noticed; but the fullest attention is given to the later, wholesale slaughter for robes. To the letterpress are added twenty-one illustrations, and there is a useful index. Some omissions are apparent, of which two must be mentioned here: There is no account of the attempt, supported by President Roosevelt, to retain the Pablo herd for the U.S.A., the failure of which permitted the removal of the herd to this country as is described here. Again, there is no discussion of the validity of the sub-specific distinction between the Bison of the Slave River region and the Bison of the plains and no mention of the "biological crime" of breeding out the difference between *Bison bison bison* and *Bison b. athabascae* by the release of the surplus animals from Wainwright in the range of the Wood Bison, although this transfer is mentioned. There is only one reference to "Wood bison" in the index, and it is only a speculation as to whether the Bison of Pennsylvania might have become sub-specifically distinct if they had not been exterinated. There is no reference to "Bison" in the index; the author uses the more popular term "Buffalo" almost entirely.

For the natural history of the American Bison, this book does not supplant,—does not attempt to supplant the older, standard authorities such as Allen and Hornaday, to which, and to others, it contains many references; but the student will here find the chief facts and many details of the disappearance of the species.—R.O.M.

THE NEW A.O.U. CHECK-LIST

Now that the new Check-list is available, contributors of ornithological material are requested to conform to its decisions in nomenclature. In cases where this is not possible, the contributor should state definitely that the 1910 Check-list, or other authority, is adhered to.—Editor.

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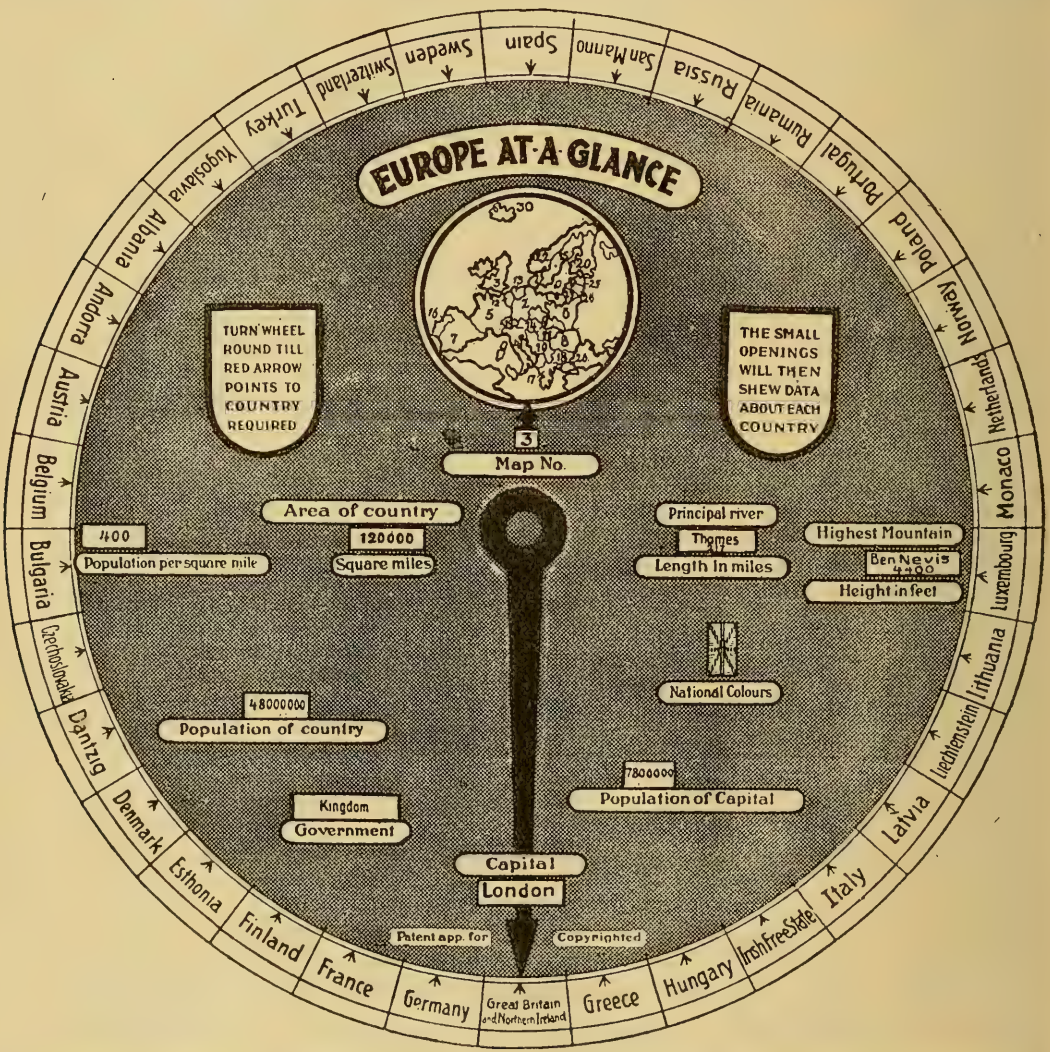

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A SHORT HISTORY OF THE PASSENGER, OR WILD, PIGEON

By Dr. HENRY HOWITT

TO THE first settlers of a considerable part of Eastern North America the now extinct wild, or passenger, pigeon was a pest, a serious one, too; it ravaged their wheat and other seeds sown for crops in the spring, and also was a scourge at harvest and other times. Gradually to a lesser extent, the trouble continued to the end of the fifties of the nineteenth century. The area involved, roughly defined, extended east from the Mississippi River to the Atlantic Ocean, and from the thirtieth North latitude up to the fiftieth.

To obtain a conception of the vast numbers of wild pigeons that existed in the region to which reference has been made, it is necessary to read the articles on the subject by J. J. Audubon and contemporary writers; a flock seen by Alexander Wilson in the early days of the nineteenth century, was estimated by him to contain 2,230,272,000 pigeons.

These Passenger Pigeons were so numerous and common that few taxidermists thought them worthy of attention. In this city there is a fine and well-preserved specimen of cock and hen, the best I have ever seen, no better possible. It is now in the possession of Mrs. F. Hall, of "Riverslea," Perth Street, Guelph. The birds are in a strong, dust-proof glass case, which will preserve them for ages; this specimen is worthy of a place in the National Museum at Ottawa, or in the Ontario Provincial Museum at Toronto.

Allow me here to make a few remarks about Guelph and the near-by country in 1851. Guelph was a small village, of which Gordon was the main business street; the stump of the first tree, cut by Dr. Dunlop, still stood, protected by a picket fence; native-born children had neither heard the railway whistle nor had seen a railway train. In the adjacent country, their homes, barns and outbuildings were, with scarcely an exception, built of logs; the open fireplace was almost the only means of heating and cooking, and in the severe cold spells of winter, it required courage to pull off the breath-frozen blankets from one's head, rise and light the fire with jacknife, flint and punk. In visiting friends I have seen this done more than once. These were the days of the slow but sure ox-teams, when the axe was the most useful implement, and when logging, threshing and building "Bees" were common—sometimes hilarious, too.

Are not the mental impressions of childhood the most vivid and lasting of all? Two incidents in my early days fixed my attention on the ways and habits of the wild pigeons.

(1) In October, 1851, when I was two years and nine months old, my father had a field prepared for fall wheat. To protect the grain from the voracious Wild Pigeons till it was buried by harrowing, he took to the place six or seven boys of the neighbourhood; I pleaded to go along and was carried there. To every one of us was given a long, light cedar stick, on the end of which a piece of red cloth was attached to frighten the pigeons off; my plot was the smallest and farthest from the woods where the birds were. I could not hold the stick by the end and sway it as the older lads did; consequently many of the pigeons flew over the better protected plots and came to mine in swarms, like flies in summer to syrup. I had hold of the stick by the middle and the free hand spent the time trying to catch one. In sowing the wheat, my father walked past my lot off and on; in passing towards the finish of the work, he took notice of my efforts, and said, "Pooh, impossible!" but before father had taken five steps, I caught one of the pigeons—a feat hitherto unrecorded of adult or child. This remarkable incident gave rise to much talk in the neighbourhood.

(2) Again, within the limits of Guelph, one day in June, 1856, when wandering through the then primeval woods of Well's Island opposite the old Red Mill—where now stands the large barn of the street cars—I found a wild pigeon's nest and took from it a downy squab of a few days old. I carried it home, kept it in a padded box of fine moss and the like on a window sill of my bedroom, fed it, and in due time it could fly. Contrary to the general belief, it became exceedingly tame and friendly. At meal hours on hot days it would fly into the house and pick food off our plates. In the morning, and on our returning from school, it would greet us in the pretty pigeon

way, alight on the shoulder of the first to come and put its bill to the lips—pigeon way of expressing love. Until the cold days of October it never flew more than a stone's throw from the house alone, but would light on my head or shoulder and go with me through the woods and on fishing trips on the farm. It always refused to go to the barnyard, where domestic pigeons were numerous, until one day a tame cock and hen alighted on the barn and the cock twirled, bowed and cooed to its mate; something in my pet answered the call and it flew from me to the pair, but the adored hen flew at it and struck it with its wings; never afterwards would it go with any of us to the barnyard.

When a hawk came within view, it flew to one of us or to cover, for protection, and when a flock of its kind flew over, its wings and movements indicated recognition and pleasure. It never tried to join one, but watched every flock till out of sight.

From the pet my brother James and I learnt something of the meaning of the calls or words of the Wild Pigeon; its calls were few, differently arranged as to import, and could be voiced by three letters, T. W. E. According to my memory, *Tweet, Twee, Tweet* meant, "Come here," "Good" and "Safety"; and the call *Twee*, in low tone, "Danger; fly to cover." For a person to voice the calls correctly required considerable practice. To accomplish it, the muscles of the face had to be so strongly contracted as to pull the corners of the mouth widely apart, and the tip of the tongue pressed against the front teeth of the upper jaw; by no other means could the calls be made. Our knowledge of the calls gave us better luck than other sportsmen of the district in hunting wild pigeons.

Before the end of November, school and other matters took our attention from the bird and soon it was practically forgotten. It had to go to the woods by the river for food. Before the end of the year we had one or more cold dips of almost zero weather.

In the Christmas holidays I went rabbit shooting; less than a mile from home I saw a wild pigeon on a tree; without grasping the circumstances, I fired, and our pet fell to the snow-covered ground, dead; on picking it up, I felt that it was plump, proving that in winter it could find plenty of food. What do the facts mentioned imply? That for hundreds of years previously, and for many afterwards, by neglecting to tame, feed and domesticate wild pigeons, the opportunity to preserve a useful bird was lost forever.

But, as squabs of wild and domestic pigeons were numerous at that date, it would have been a better plan to collect a large number of both kinds, imprison them in one place, and, when the plumage made the sex known, pair them; by feeding and taming each pair separately, a new, hardy and useful species would have been the result—a species that would thrive in our Canadian climate and be easily domesticated.

To-day, the few native-born inhabitants of Ontario who were observant and who can recall events that occurred in the jurisdiction of Lord Elgin, in Upper Canada, know that there were four distinct kinds of wild flights each season; namely, the Spring and Autumn migrations, the local flights of the old birds and those of the young ones; all of them differed in several respects from each other. It is impossible to describe the ways and habits of the bird correctly unless this is noted. The Spring flight was always the first every year, and the Autumn, the last.

THE SPRING MIGRATIONS OF WILD PIGEONS

I shall endeavour to depict the four flights separately in the order in which they took place each year, and it is my hope to state some data, facts and circumstances relating to the habits and ways of the Passenger Pigeon that have not hitherto been recorded.

For unknown ages before 1851 the wild pigeon was vastly more numerous than in my days. With the exception of two or three years from 1852 until the pigeons disappeared completely in our district, I spent hours, more than once most of the day, observing the April flights. And every year of my observations I paid particular attention to the altitude, direction, contour, and the strata formation of the Spring flocks; also from what quarter they came and disappeared. Invariably the flocks which passed over my observation place first became visible in the East, well above the distant forest horizon, like mist or haze that, on nearer view, quickly became a flock of pigeons which, in like manner, faded from sight in the West; altitude about a quarter of a mile, and direction, a straight line from East to West; and all the flocks to right or left of me did likewise.

Every year all the spring migration flocks resembled one another in contour very closely; all had strata formation; the small ones had only two or three strata, the large ones, about thirty or more, according to their size. In every case the lowest stratum was longest in every direction; each stratum above it to the top was one or two birds shorter than the stratum below it; hence, in every direction there was a slope from top to bottom; in every flock the front slope was the shortest, the rear one, the longest of all, and those of the sides were considerably longer than the front one. The space between the several strata appeared less than a foot, and all the birds of all

the strata seemed to have only enough space sideways to move their wings freely.

The strata of the large flocks were always limited in number to less than forty. The lowest stratum of all the flocks was nearly as level and even as the surface of a lake on a calm day; so were all those above it. According to my memory, the wings of all the birds of each flock moved synchronously with the wings of the leader. The speed of the Spring flight was estimated by many to be a mile a minute, and in my opinion this was not an exaggeration—always faster than all the other kinds of flights. And of all kinds, the distance from side to side was greater than from front to back.

The date of the Spring migrations was always in April and on a fair day following a moonlit night; duration of the flights, part of a night and one day only. Never did a flock change its course or alight within the range of my sight. But wild pigeons were in the woods of the neighbourhood which must have alighted before daylight

In the early 1850's small and large flocks were so numerous as to dot the sky in every direction, and frequently a flock would darken the sun. After 1854 the Spring flocks became less numerous and about 1869 practically ceased in the neighbourhood of Guelph—were still numerous farther West, especially in Michigan.

THE LOCAL FLIGHTS OF OLD PIGEONS

On their first arrival each year they were more numerous in places where beech, elm and oak nuts were plentiful, also, wherever cranberries and other proper food could be obtained. The contour of these flocks was irregularly roundish and had no strata,—in other words, it was fly as you please. In the woods and on short flights in open places, the pigeons flew low, but when the distance was more than a mile, they flew higher than our guns could reach. Soon a suitable site for a rookery or breeding place was located; it was always situated close to a river or creek and where fir trees were numerous; then their crude nests were built on the lower branches of all the near-by trees, eggs laid, hatched, and the young ones fed until they could fly.

Some old observers maintained that the cock and hen took turns on the nest till the young pigeons could fly, while others declared that the cock merely carried food to the nest.

The base of the crude Passenger Pigeon's nest consisted of small pieces of sticks on which leaves and feathers were laid, then some moss, and lastly, a little down. The centre of the nest was not much lower than the rim. Hence the nest was never placed on the upper branches of trees, where wind swayed them most, nor near the outer end of long branches; but near the trunk the nests were placed very close to each other. All the nests examined by the writer had only one egg.

It was said that the first food given to the young squabs was masticated by their parent birds—some said, swallowed, digested, and regurgitated.

During the hatching season each year, the flights of the old pigeons went from the rookeries to the feeding places and back again; these flights often divided into two or more flocks, which took different directions to wherever food could be found. In 1855 the last rookery near Guelph, a small one, was in what was then called Hatch's Swamp. In those days the swamp extended a mile or more North along the Pound Creek from where to-day the Guelph Collegiate-Vocational Institute stands. Never afterwards was there a rookery within many miles of Guelph, but some lone pairs of the pigeons built a few nests along the River Speed, widely separated; these were the only nests that I had an opportunity of examining for I was too young at that time to visit a rookery.

Old inhabitants of that time frequently spoke of an immense rookery that about 1835 extended on both sides of the River Speed from Guelph to Rockwood; within its bounds trees were broken down by the weight of the pigeons, and at the proper time wagon loads of the young birds could be easily obtained.

The number of wild pigeons that came yearly varied; the year 1854 was a great pigeon year, and father west, so was 1863.

LOCAL FLIGHTS OF YOUNG PIGEONS

For about a week after they could fly, they were too weak to rise high and keep the pace of the old ones. They seldom flew higher than twelve feet above the ground except to pass over obstructions in their way. These flights were in the course of least obstruction from the rookery to a place where food was plentiful and back; they were never straight and often followed the course of a creek. In formation these flocks were longish, small, numerous and followed one another closely. The morning flight took place at dawn, and the evening about 4 p.m.

In the year of the rookery in Hatch's Swamp there were few obstructions between the rookery and the feeding place on the higher ground to the south beyond the river; one of the highest was the embankment of the then named Grand Trunk Railway. On several occasions, when on my way home from school, I saw and watched the evening flight. Guelph sportsmen on the embankment shot many of the pigeons, and more were killed with sticks.

At the period of the great rookery between Guelph and Rockwood a very large flight of the

young birds went for days within fifty yards of the home of the late much respected and worthy Jonathan Oakes, who lived less than a mile south of the Village of Guelph. Whenever he wanted a dainty pie of tender pigeon-breasts, all he had to do was to take his fish pole, get behind a low bush in the line of flight, and sway it among the pigeons. This flight,—like several others from the rookery —appeared to be many miles in length, and narrowish.

AUTUMN MIGRATION

The Autumn Migration took place either late in September or early in October, according to the season; in consequence of my youth, I had no opportunity to observe this flight until the wild pigeon almost disappeared from within the limit of my observation. The few flocks that I saw were small, and as to altitude, swiftness, and strata formation, resembled those of the Spring Migration, but they went in a straight line from the West to the East.

ADDITIONAL REMARKS

In the neighbourhood of Guelph no wild pigeons were slaughtered at any time for sale.

The small flocks from 1850 to 1854 consisted of one hundred to almost a thousand birds; the large ones, of a thousand birds to a million or more—few flocks, of several millions.

No epidemic affected the wild pigeons in the neighbourhood of Guelph.

It was the universal belief of writers and citizens that it was impossible to tame a wild pigeon; but does not my experience contradict this theory?

The last wild pigeon that I saw—a lone hen—was in July, 1881. It sat on a dead branch on top of a tree near the river, opposite where the Ontario Reformatory now stands. It is generally known that the last living pigeon died in the Cincinnati Zoo in 1914; it was a hen bird, twenty years old at the time of its death. Under normal conditions, the life of the Wild Pigeon was probably several years longer.

PHYSIOLOGICAL CHANGES AND THE ORIGIN OF SPECIES

By W. E. RICKER

IN A RECENT book on "The Species Problem", G. C. Robson[1] has shown that the differences commonly used to separate species are usually not of adaptive value, although characters which distinguish genera and higher groups are often obviously related to the habits of the organisms in question. The obvious inference from his discussion is that since specific characters are not usually of adaptive significance, species have not arisen by natural selection.

If the morphological characters used by systematists to separate species are the only differences between them, this must be a valid conclusion. But if, existing alongside the more evident morphological traits and perhaps genetically "linked" with them, there is a physiological distinctness, natural selection may yet be effective in species differentiation.

Evidence of the physiological distinctness of closely related species is supplied by differences in metabolic products, by food preferences, or by different reactions to stimuli. Although such evidence may be obtained from practically every great division of the organic world, certain groups are better adapted to its demonstration than others. Dependent plants are particularly instructive, because they offer an indication of small grades of physiological distinctness, in the nature of the sub-stratum or host from which they derive their food. A few examples may be considered:

BACTERIA

Physiological reactions in pure culture such as production of indol and hydrogen sulphide, diastatic action, relation to oxygen, nitrate production, etc., are now regularly used to define species and even genera among the bacteria. In many cases significant physiological differences are found between strains which are identical under the microscope.

BASIDIOMYCETES

In certain genera, especially among parasitic rusts, occur species or varieties which are distinguished only by the host or type of substrate upon which they live. The wheat rust is especially interesting. Within the species *Puccinia graminis* are several races, each of which attacks a particular host: one for rye, one for oats, one for wheat and certain native grasses, etc. Recent intensive work has shown that there are also slight morphological differences, as in the average size of the spores. Finally, within each of these races there are "biologic forms." In the wheat race a large number of these have been found, distinguishable only by the severity of their attack on various strains of wheat. It is reasonable to suppose that these forms and races are the initial stage of species formation and that the

[1] Edinburgh and London, 1928.

only significant differences between them are of a physiological nature.

PISCES

In the lakes of north-eastern North America fishes of the salmonoid genus *Leucichthys* are usually abundant. The genus consists of a great many closely related species, which are distinguished morphologically by differences in the number of gill rakers, length of fins, body proportions, etc. Neither Koelz nor Pritchard, who have studied these fish, was able to suggest how such characters could be of value in determining the present ecological distribution of the species, still less account for their origin. Their work suggests rather that the initial differentiation was physiological, and resulted in races adapted to different depths of water; the present morphological differences have been bolstered by their subsequent physical or sexual isolation.

AVES

Empidonax virescens and *E. minimus* are two small American flycatchers whose appearance is so similar that only an expert can identify a museum skin. In the field, however, even an amateur naturalist cannot confuse the two; they differ conspicuously in note, habitat, structure and situation of the nest, and in their action and habits. It is evident that in this case very little structural change has as yet followed the original physiological distinction.

In general it appears that the real differences between closely related species are physiological and that where morphological differences do characterize them that these are usually of secondary nature.

Such considerations have led the author to the belief that *in species formation, physiological changes precede morphological changes.*

Consider a species in the ranks of which a new physiological race has recently appeared. Because of the different physiological reactions of the new race, it occupies a different habitat, perhaps a warmer one, or darker, or moister. This ecological isolation will prevent the new form's interbreeding with the original one. As a result of this isolation, morphological peculiarities may ultimately come to characterize the new race. These might be the result of environmental selection of certain types; they might be caused by the direct action of some factor in the new environment, or they might be only an incidental result of the changed metabolism of the creature.

This hypothesis suggests an explanation for another fact of taxonomy: the ease with which species are often distinguished by secondary sexual characters, particularly among insects, birds, and certain Crustacea. Because of the mobility of the adult stages of these animals, it would be hard to effect the sexual isolation of a new race. For example, in an insect species a physiological variation may arise which fits the larva to inhabit a new ecological niche, quite apart from the larvæ of the original stock, yet the imagos may still intermingle and interbreed. The hybrids will not be so perfectly adapted to either available habitat, and might also be less fertile than the pure races; hence it is to the advantage of both races if interbreeding can be prevented. In such a case, natural selection will eagerly seize upon any variation which will keep the two apart. This may indeed be the only method of ensuring the survival of the new form.

Among insects such variations take the form of peculiar colour patterns, or modifications of the genital appendages. The male of every North American species of the odonate genus *Somatochlora* has its superior anal appendages moulded into a distinctive shape, which exactly fits a corresponding groove on the back of the head of the female; so that it can copulate only with those of its kind. *Libellula* has undifferentiated appendages but cross-breeding is avoided by each species having a distinctive colour pattern. The origin of the brilliant plumage of many of our birds might also be explained in this way.

SUMMARY

The fact, now well established, that morphological differences separating species or races are only rarely of adaptive significance, suggests that these visible distinctions are merely incidental to a more fundamental physiological differentiation. The necessity for the isolation of new physiological forms, if they are to survive, may provide an explanation of the development of secondary sexual characters in some groups of animals.

ACKNOWLEDGEMENTS

This paper is written at the suggestion of Professor J. R. Dymond of the University of Toronto. The author is also indebted to other members of the staff of the departments of Biology and Botany for advice, criticism, and illustrations.

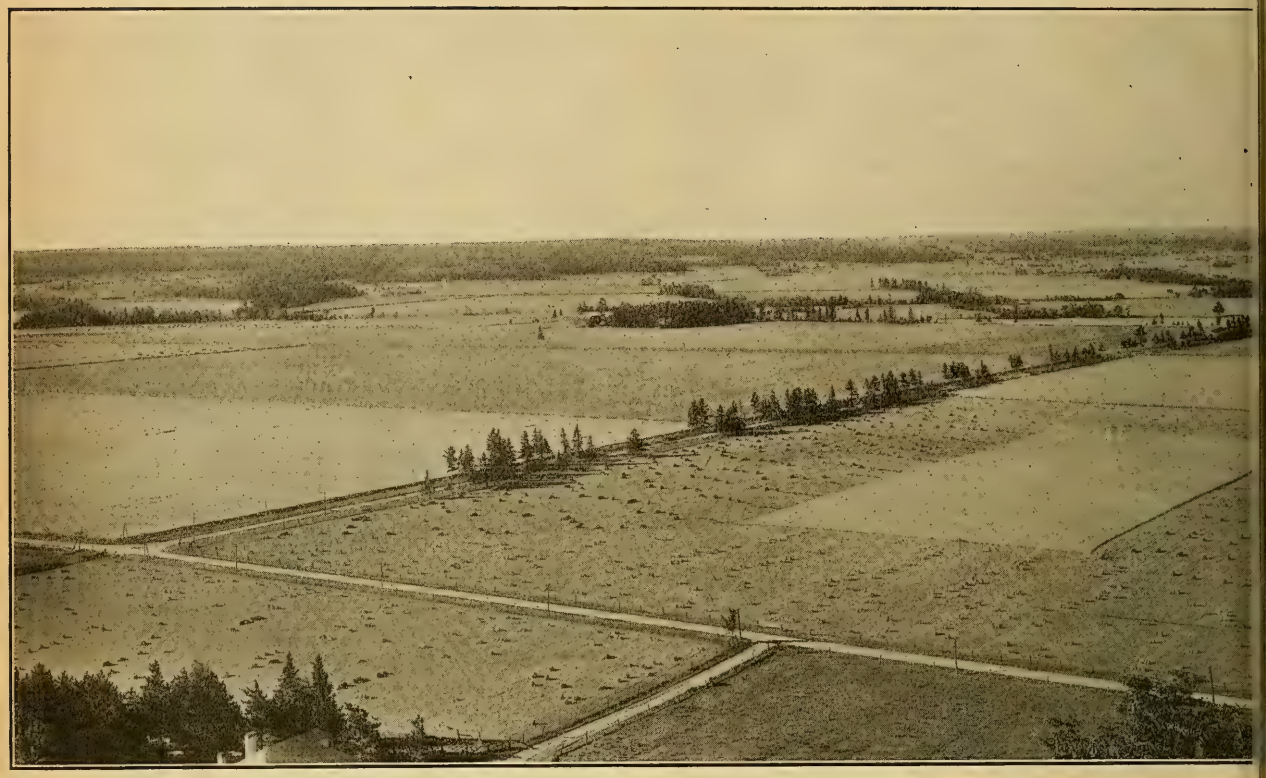

FIGURE 1. The Valley of the Bonnechere River from the "Pinacle" a rocky knob overlooking the valley on the north. The Trans-Canada Highway in the foreground.

*THE MAMMILLARY MOUNDS OF THE BONNECHERE VALLEY**

By M. E. WILSON

THE VALLEY of the Bonnechere river to the west of the town of Renfrew is a plain-like area of fertile farm-land three miles wide, the uniform surface of which forms a striking contrast to that of the rocky Laurentian highlands that overlook the valley from either side. (Figure 1.) This flat area continues westward for about 10 miles where it gives place to the rolling topography characteristic of the surface of the boulder clay deposited by the melting away of the last glacial ice-sheet. Here and there along the western margin of the flat peculiar gently sloping mounds protrude above its surface. (Figure 1.) These mounds are not unlike the mounds found farther south in the United States that are believed to have been built by the pre-historic aboriginal inhabitants of North America. The mounds of the Bonnechere valley, however, are not the handiwork of man, but of nature.

Wherever the clay underlying the Bonnechere flat is exposed in the banks of the river, or in wells or other excavations, it is seen to be uniformly stratified and similar in every respect to the stratified clay that underlies the greater part of the lower Ottawa and St. Lawrence valleys, and which it is believed, because of the presence of the remains of sea-fish (*Mallotus villosus*), barnacles, and other evidence of marine life, was deposited during a marine submergence that advanced into this region following the disappearance of the last (Labradorean) ice sheet. At this time the whole Ottawa valley as far north as Maniwaki and at least as far west as Chalk River was a gulf of the sea from which the higher rock areas protruded as islands. As the clay particles held in suspension by the sea of this pre-historic Gulf of St. Lawrence settled to the sea bottom they were deposited more thickly in the depression between the knolls and hills of the glacial boulder clay and rock debris that covered the bed-rock surface, so that in time the flat clay surface that now occupies

*Published with the permission of the Director of the Geological Survey, Department of Mines, Ottawa, Canada.

FIGURE 2. Mammillary mounds in the Bonnechere Flat.

the Bonnechere valley at Renfrew was developed. The peculiar-looking mounds that protrude from the surface of the flat represent merely a transitionary stage in the development of the flat, the mounds being knolls of glacial materials not completely buried by the stratified clay.

MOLLUSKS FROM ST. JOSEPH'S ISLAND, ONTARIO, CANADA

By HORACE G. RICHARDS
University of Pennsylvania

DURING August, 1930, I was able to make a small collection of mollusks from the Canadian shores of the North Channel of Lake Huron at Gravelly Point, St. Joseph's Island, Ontario. Although the list is small and differs only slightly from published lists from other parts of Georgian Bay and northern Michigan, it is thought advisable to record it at this time. The following species were found:—(1)

GASTROPODA

Lymnæa palustris (Mull)
Lymnæa obrussa Say
Physa vinosa Gould
Helisoma antrosum (Conrad)
Helisoma campanulatum (Say)
Gyraulus deflectus (Say)
Valvata tricarinata Say
Amnicola limosa (Say)
Amnicola lustrica Pilsb.
Cincinnatia binneyana Han.
Campeloma rufum (Hald.) (young)
Campeloma decisum Say
Pleurocera subulare (Lea)
Gonyodiscus cronkhitei var. *anthonyi* (Pilsb.)
Succinea retusa Lea

PELECYPODA

Pisidium noveboracense Prime (?)
Sphærium solidulum (Prime)
Anodonta marginata Say (?)
Lampsilis siliquoidea Barnes.

[1] I am indebted to Mr. E. G. Vanatta for help in the identification of the specimens. A collection has been deposited in the Academy of Natural Sciences of Philadelphia.

CONTRIBUTIONS TO THE KNOWLEDGE OF EXTREME NORTH-EASTERN LABRADOR

By BERNHARD HANTZSCH

TRANSLATED BY M. B. A. ANDERSON

"Beiträge zur Kenntnis des nordöstlichsten Labradors," von Bernhard Hantzsch, *Mitteilungen des Vereins für Erdkunde zu Dresden.* Dresden, Volume 8, 1909, pp. 158-229. Volume 9, 1909, pp. 245-320.

(Translated from the original German text in the Library of Congress, Washington, D.C., by M. B. A. Anderson, M.A., Ottawa, 1928.)

Original pagination given in the text.

(*Continued from page 12*)

Ursus maritimus Erxl. var. *ungavensis* ? (Knottn.-Mey.). Eisbär. Nennuk. POLAR BEAR.[22]

From two skulls collected by me and now in the Royal Zoological Museum in Dresden, Theodor Knotterus-Meyer suspects that there is an independent subspecies of the polar-bear in our district: (Über den Eisbären und seine geographischen Formen: Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin, 1908, p. 181). Every year some individuals are killed during the winter months, occasionally near the houses; seen more rarely in summer, most regularly on Button Islands, where at the beginning of August, 1906, three old animals were pursued by Paksau, who was to be my companion later, and another Eskimo. A skin is worth six to fifteen dollars.[23]

Ursus americanus sornborgeri Bangs. Schwarzer Labrador-Bär. BLACK BEAR. Aklak.[24]

Rarely comes to the southern parts of this district. Skin is worth about three to five dollars.

Gulo luscus (L.) Vielfrass. WOLVERINE. Kabvik.—Rather rare, more in the south. Skin, three to five dollars.

Mustela caurina brumalis Bangs. Marder, LABRADOR MARTEN. Kabviaitsik.—Seldom northward beyond the border of the forest. Skin is worth ten to sixteen dollars.[25]

Putorius vison (Briss.) Mink. MINK. Kanojorniut.—Not frequent in the southern part. Skin, six to twelve dollars.[26]

Putorius cicognanii (B.p.). Hermelin. ERMINE. Terriak.—Not rare. Observed by me twice. Winter skins worth up to twenty-five cents.[27]

Trichechus rosmarus L. Walross. ATLANTIC WALRUS. Aivek.—At present has noticeably decreased in number in these districts. It is said to be still secured most regularly in the vicinity of the Ikkerasak, as long as there is thick pack ice there. Four individuals observed by me once only. Flesh and stomach contents are relished, the blubber used as with seals, the thick skin cut into strips of leather. Among other things they make harpoon and kayak paddle tips from the tusks.[28]

There occur the following species of seals, Seehunden. Eskimo, Puije:

Cystophora cristata (Erxl.). Klappmütze. Netsivak. HOODED SEAL.—Quite rare at present. Skin is worth two to six dollars, according to size.

Halichœrus grypus Fabr. GRAY SEAL. Grauer Seehund.—Apparently occurring only rarely.

Phoca barbata Fabr. Bartrobbe. Ukjuk. BEARDED SEAL.—Frequent. Skin is worth one to four dollars.[29]

Phoca vitulina concolor DeKay. Gemeiner Seehund. Kassigak. ATLANTIC HARBOUR SEAL.—Not especially frequent; skin worth one-half to one dollar, that of younger animals worth the most.

[P. 255.]

Phoca grœnlandica Fabr. Grönländischer Seehund. GREENLAND SEAL. Kairolik.—Frequent. Skin, fifty cents to three dollars.[30]

[22] *Tharlarctos maritimus* (Phipps).

[23] The Ungava Polar Bear, for which Knotterus-Meyer tentatively suggested the name *Thalassarctos maritimus ungavensis* on the basis of an adult female and a male cub collected by Bernhard Hantzsch, is considered of very doutbful tenability by many North American mammalogists, although admitted to the lists of Miller (1924) and Anthony (1928). In addition to the typical Polar Bear, *T. maritimus* (Phipps) with type locality Spitsbergen, Knotterus-Meyer (1908) recognized *T. marinus* Pallas (from mouth of Ob and Yenesei Rivers, Siberia), and described four additional new species: *T. grœnlandicus* (East Greenland, wandering west to Julianehaab), *T. spitzbergensis* (North and West Spitsbergen, Seven Islands), *T. jenaensis* (East Spitsbergen, Jena Island), and *T. labradorensis* (Labrador coast, from 55° southward to Newfoundland, and most southern points of Greenland). It hardly seems probable that such a widely-ranging holarctic species which spends much of its time on drifting ice-floes and is occasionally carried down as far as Iceland and Newfoundland, should split into four races in the comparatively narrow limits around southern Greenland and the Labrador peninsula. Knotterus-Meyer's diagnoses, while based upon elaborate skull measurements, no less than twenty-seven to each skull, appear to make little if any allowance for the wide range of individual variation which is so marked in a series of bears from any one region.—R. M. Anderson.

[24] This subspecies not now recognized.—R.M.A.

[25] The North Labrador Marten, which is listed by Miller (1924) and Anthony (1928) as *Martes brumalis* (Bangs) should undoubtedly be placed as a sub-species of the Eastern American Marten and stand as *Martes americana brumalis* (Bangs). The marten, where not driven out by civilization or trapped out, range from southern Canada to the northern limit of trees without any appreciable dividing line, and are more or less variable in any district. The *Martes caurina* group is now understood to be restricted to the Rocky Mountians and Pacific coast districts.—R.M.A.

[26] *Putorius vison* (Briss.) MINK. Mink. Kanojorniut-Not frequent in the southern part. Skin six to twelve dollars.

[27] Bonaparte Weasel. Probably here the typical form *Mustela cicognanni cicognanni* Bonaparte.—R.M.A.

[28] The walrus is now placed in genus *Odobenus* Brissen (1762) the species stands as *Odobenus rosmanus* (Linnaeus).—R.M.A.

[29] The Bearded Seal is now placed in the genus *Erignathus* Gill (1866) and the species stands as *Erignathvs barbatus* (Erxleben).—R.M.A.

[30] The Greenland Seal, Harp Seal or Saddle-back now stands as *Phoca grœnlandica* Erxleben.—R.M.A.

Phoca hispida Schreb. Ringelrobbe. RINGED SEAL. Netsek.—By far the most common species. Skin worth twenty to sixty cents.

Killinek has the reputation of being the district which has the greatest abundance of seals among the Moravian stations in Labrador. Hunting begins as early as March or April. For this purpose they start out with dog-sleds for localities where the female seals are accustomed to give birth to their young, for example, Operngevik, which means spring hunting place. The young seals, yellowish white in colour, which do not go out into the water as yet, are lying in sheltered cavities on ice-cakes. The Eskimos beat or kick the helpless little creatures to death, and are often able to capture the anxious mother too, that stays watchfully nearby. They like to make coats for small children from the beautiful soft pelts of the young. Later in the year the seals are pursued in the kayak, and shot at with guns whenever their heads rise above the surface of the water. If the seals are swimming in deeper water, then as a rule small shot is used to wound them only. Then the Eskimos follow the creatures which soon become weaker from loss of blood, as quickly as possible, until they are close enough to harpoon them. If the seal dies beforehand, it sinks and in most cases is lost. But in the Autumn the animals are often so fat, that they float on the surface. If the seals are lying on the ice-cakes or swimming in shallow coast waters, the hunters prefer to shoot at the head or the heart in order to cause immediate death, which occurs very easily with these animals. A large bright red, bloody surface marks the spot where the prize sank under the water. It is pulled up with a large hook or a noose, a thong is pulled through the nose or fin-like feet and it is tied to the kayak. Probably half of the seals shot or killed are lost, since the animals are hunted with guns and no longer merely with harpoons as in former years.

As a more sensible way the autumn hunt must be mentioned, which is carried on with great zest at Killinek, as long as the sea is entirely free of ice. They shut off the neighbouring inlets with immense large-meshed nets, the swimming seals become entangled in the mesh-work, cannot escape, and being mammals, soon drown. About 800 were collected in 1906 in this way at Killinek, along with sixty white whales. (Missions Blatt der Brüder Gemeine, 1907, p. 271.)

During these weeks life at the station has no other interest than the hunt. Everyone, from Eskimo child to missionary is busy with it. In my time only a few people possessed any nets; the others rented such nets from the station, but had to turn in half the catch. The thought occurs, that much damage is done to the valuable nets, especially by sharks or by ice which suddenly appears. Whenever the weather permits at all, they inspect the nets once or twice a day. This must be done quietly and carefully. [P. 256.] The captured seals are often permitted to bleed to death in the water, and are brought near the store-houses on the beach. That is the men's work. In rather severe cold now begin the duties of the women, which are by no means easy. They lay the animals on their backs, cut the body from the chin to the tail with a semi-circular-shaped knife (*Ullo*), which has a handle, and cuts down deep through the layer of blubber, which is under the skin, until the dark flesh is visible. Then they skilfully and quickly peel off the blubber with the attached pelt, in a quarter to three-quarters of an hour, according to the size of the animal. As a rule the outer part of the webbed flippers are cut off and at last the flexible blubber-lined hide lies on one side, the slender body deprived of its fat, on the other. The best pieces of the flesh, the liver, etc., are kept for their own use, though for this purpose they prefer the animals which have been shot to those drowned. They keep the less desirable pieces as winter food for the dogs; the remainder, especially the entrails, they give the dogs at once. The greedy creatures pull and tear at the long intestines, and cover themselves with blood and other less pleasant matter, so that they seem very uninviting in appearance and odour. But this time is the great time of the year for the dogs, in which they stuff themselves up to the neck and thus acquire strength for the work of the winter. In a special blubber house near which as noted I had my strong smelling work room for eight days, the layer of blubber is separated from the skins. Much skill is needed for this task, not to cut into the soft hide with the knife, sharp as a hair. Then the skins are salted down mostly in casks for later export in this condition. They dry other skins as far as the weather of the late season permits, spreading out the skins wide. The subsequent dressing, which is necessary if the skins are to be used for clothing material, consists mostly of freezing several times, thawing, kneading and squeezing, and finally careful washing in strong hot soda or soapy water, in order to remove the fat. Women who can prepare the thick hides neatly and make them comparatively soft, such as the skins of the bearded seal, which are used for boots particularly, are looked upon with favour by the men.

Such blubber as is destined for export is cut up into strips by selected blubber-women, who do not look particularly attractive during this

work. It is then ground up with simple machines, the resulting mass distilled in large vats, the oil placed in casks, the residium used as dog-food. In some family households the beautiful old custom is still in vogue, where the women cut off strips of blubber, put it in their mouths, work it with their teeth, and spit the liquid chewed from the blubber in the shallow blubber lamp where it serves as material for burning. Old women have their molar teeth worn down to the gum from this work, and have only short broad incisor and cuspid teeth. [P. 257]. They occasionally use the dried and stretched out entrails for window panes, as they do caribou sinew for thread.

Sorex merriami miscix, Bangs. Spitzmaus. SHREW. Uksunavik.—Probably only in the south of this district.[31]

(To be continued)

[31] *Sorex cinereus muscix* Bangs.—R.M.A.

AN ANNOTATED LIST OF VASCULAR PLANTS COLLECTED ON THE NORTH SHORE OF THE GULF OF ST. LAWRENCE, 1927-1930

By HARRISON F. LEWIS

(Continued from page 18)

LEGUMINOSÆ

TRIFOLIUM PRATENSE L., var. EXPANSUM Hausskn.

Betchewun, September 3, 1929, grassy clearing. Natashquan, September 10, 1927, turf near house. Recorded by St. John as *Trifolium pratense* L.

TRIFOLIUM REPENS L.

St. Mary Islands, July 25, 1927, turf near boathouse on the western island.

TRIFOLIUM HYBRIDUM L.

Natashquan, August 5, 1927, grassy roadside.

*TRIFOLIUM AGRARIUM L.

Matamek River, September 5, 1928, dooryard, and Natashquan, August 5, 1927, grassy roadside.

VICIA CRACCA L.

Natashquan, August 7, 1927, wooded roadside. The Bluff Harbour, August 1, 1927, at site of an old building on big island.

**Astragalus Fernaldi* (Rydb.) n. comb.

Atelophragma Fernaldi Rydberg, Bull. Torr. Bot. Club, 55: 126, 1928.

Ile au Bois, July 7, 1930, turf on sand just above outer beach. Comparison made with paratype, M. L. Fernald and K. M. Wiegand Coll., No. 3632, Blanc Sablon, August 6, 1910, now No. 93148 in Nat. Herb. of Canada, which shows fruits but no corollas. Rydberg, in his original description of the species, says, "corolla purple", but the material seen growing by me, which was all in anthesis, had much paler corollas, near the "French Gray" or "Lilac Gray" of Ridgway's "Color Standards and Nomenclature", 1912.

**Oxytropis johannensis* Fernald.

Ile au Bois, July 7, 1930, turf on sand just above outer beach. Abundant, far out-numbering *Astragalus Fernaldi*, in close association with which it was growing.

Lathyrus maritimus (L.) Big., var. *aleuticus* Greene.

St. Mary Islands, July 23, 1927, turf near shore of eastern island. Whale Head, July 10, 1927, turfy bank near Jas. Mauger's harbour. Net Island, July 4, 1927, in moss and lichens on low, rocky point. Recorded by St. John as *Lathyrus maritimus* (L.) Big.

Lathyrus palustris L. var. *pilosus* (Cham.) Ledeb.

Wolf Bay, July 31, 1927, low, grassy flat near shore of the island called "The Black Land".

CALLITRICHACEÆ

Callitriche palustris L.

Kegaska, September 4, 1927, in 3 inches of water in slow-flowing brook. St. Mary Islands, July 23, 1927, small pool in rock on eastern island.

Callitriche anceps Fernald.

Bradore Bay, August 27, 1927, in 1 foot of water in slow-flowing brook on calcareous sandstone.

EMPETRACEÆ

Empetrum nigrum L.

Fright Island, June 4, 1927, edge of spruce and fir woods on high bank. Natashquan, May 15, 1928, matted by the roadside on a rocky hill and shedding pollen on this date. One of the most abundant vascular plants of the region.

Empetrum atropurpureum Fernald & Wiegand.

Seven Islands, September 11, 1928, sandy roadside. Thunder River, September 2, 1928, granitic crest. Mascanin, August 20, 1928, granitic crests. Harrington Harbour, July 25, 1928, edge of vegetation on granite at shore of mainland. Sholiaban, July 23, 1928, edge of vegetation on granite near shore of mainland. Also observed at Hospital Island (Harrington Harbour), Baie Johan Beetz, and Magpie.

Particularly abundant and luxuriant at Mascanin, along crest of rocky ridge of mainland, on west side of bay. Recorded by St. John only from "Archipel de St. Augustin: île des Genévriers, rocky crest". All of the stations at which I found it are farther west than this. Range extension, 372 miles W.

Empetrum Eamsii Fernald & Wiegand.

Bonne Esperance, August 22, 1927, rocky crest of island. Salmon Bay, August 23, 1927, bare, high, rocky part of Caribou Island.

AQUIFOLIACEÆ

Nemopanthus mucronata (L.) Trel.

Mascanin, August 20, 1928, dry hillside. Mutton Bay, July 23, 1928, hillside thicket.

ACERACEÆ

Acer spicatum Lam.

Betchewun, August 26, 1928, border of woods.

BALSAMINACEÆ

Impatiens biflora Walt.

Kegaska River, August 15, 1928, small ravine on a small island near the mouth of the river. Romaine, September 2, 1927, foot of sandy bank. Wolf Bay, July 31, 1927, on the island called "The Black Land". Harrington Harbour, July 25, 1928, wet alder thickets on sand beside shore of mainland. Recorded by St. John from "Mingan islands: Eskimo island" only. Range extension 189 miles E.

RHAMNACEÆ

Rhamnus alnifolia L'Hér.

Betchewun, August 26, 1928, damp coniferous woods.

GUTTIFERÆ

Hypericum boreale (Britton) Bicknell.

Mingan, August 30, 1928, sand flat beside Mingan River.

CISTACEÆ

Hudsonia tomentosa Nutt., var. *intermedia* Peck.

Seven Islands, September 11, 1928, in sandy woods of *Pinus Banksiana*, half a mile from shore.

VIOLACEÆ

Viola nephrophylla Greene.

Kegaska, June 23, 1928, shallow turf near shore on Green Island. Recorded by St. John from "region of Mingan islands" only. Range extension, 80 miles E.

Viola pallens (Banks) Brainerd.

Wolf Bay, June 18, 1928, sheltered turf on the island called "The Black Land". Mutton Bay, July 9, 1927, very wet sphagnum beside brook in basaltic dyke ravine. La Tabatière, July 7, 1927, grassy area at head of cove, and July 21, 1928, wet ground beside thicket. Bradore Bay, June 25, 1927, and June 28, 1927, wet brookside on calcareous sandstone.

**Viola pallens* (Banks) Brainerd x *incognita* Brainerd.

Harrington Harbour, June 20, 1927, brushy ravine.

Viola incognita Brainerd.

Betchewun, August 25, 1928, among tall grass and nettles on Gun Island. Watshishu, May 26, 1928, in bloom among low bushes on crest of knoll on granitic island. Natashquan, August 9, 1927, shady roadside in village.

Viola renifolia Gray, var. *Brainerdii* (Greene) Fernald.

Fright Island, June 4, 1927, damp, mossy, open places near shore. Eskimo Island, Mingan Islands, August 28, 1928, coniferous woods at foot of limestone cliff. Reported by St John from Blanc Sablon only. Range extension, 313 miles W.

Viola labradorica Schrank.

Betchewun, June 5, 1927, grassy area on limestone near shore. Bradore Bay, June 25, 1927, damp humus near brook-bed on calcareous sandstone.

*VIOLA TRICOLOR L.

Betchewun, September 3, 1929, dooryard of uninhabited house. Given by St. John as hypothetical.

ELÆAGNACEÆ

Shepherdia canadensis (L.) Nutt.

Fright Island, June 4, 1927, on sandy area just back of beach.

ONAGRACEÆ

Epilobium angustifolium L.

Natashquan, August 7, 1927, burned woody bank.

Epilobium latifolium L.

Mingan, August 30, 1928, sand bar in Mingan River.

Epilobium palustre L.

St. Mary Islands, July 23, 1927, crevices in rock near shore of eastern island.

Epilobium palustre L., var. *monticola* Hausskn.

Wolf Bay, July 31, 1927, wet sphagnum on the island called "The Black Land".

Epilobium palustre L., var. *longirameum* Fernald & Wiegand.

Ste. Genevieve Island, August 23, 1928, wet area just above beach. Sholiaban, July 23, 1928, dooryard. Not recorded by St. John west of "Archipel du Petit-Mécatina: îles Netagamiou". Range extension, 161 miles W.

Epilobium glandulosum Lehm.

Rock near Fog Island, August 9, 1928, crevice in rock. Wapitagun, July 30, 1927,

crevices in exposed rock near shore of outer islands.

**Epilobium glandulosum* Lehm., var. *adenocaulon* (Hausskn.) Fernald.

Natashquan, August 7, 1927, base of burned bank beside fresh marsh. Romaine, August 11, 1928, foot of sandy bank at top of beach.

**Epilobium glandulosum* Lehm., var. *cardiophyllum* Fernald.

Harrington Harbour, July 25, 1928, alder thicket on sand and clay bluff beside shore of mainland.

**Oenothera muricata* L.

Natashquan, August 5, 1927, sand dunes.

Circæa alpina L.

Natashquan, August 5, 1927, moist, shady woods. St. Mary Islands, July 27, 1927, damp, loose soil of brown humus on Cliff Island. La Tabatière, July 21, 1928, wet, shaded humus soil

HALORAGIDACEÆ

Hippuris vulgaris L.

Cormorant Rocks, southeast of Cape Whittle, July 17, 1927, wet ground in hollow on small island.

**Hippuris vulgaris* L., f. *fluviatilis* Hoffm.

Baie Johan Beetz, August 22, 1928, small, slow-flowing brook. Blanc Sablon, August 26, 1927, Blanc Sablon River.

Hippuris vulgaris L., var. *maritima* Hartm.

The Bluff Harbour, August 1, 1927, pool in brackish marsh on big island.

ARALIACEÆ

Aralia hispida Vent.

Natashquan, August 5, 1927, woody roadside bank. Observed also at Seven Islands, Mingan, and Mascanin. Recorded by St John from Mingan only. Range extension, 104 miles W. and 98 miles E.

Aralia nudicaulis L.

La Tabatière, July 7, 1927, wooded bank near shore.

UMBELLIFERÆ

**Cicuta maculata* L.

Betchewun, August 26, 1928, damp hollow near dwelling.

Cicuta bulbifera L.

Kegaska, September 4, 1927, bank of brook, and August 14, 1928, among grass and sedges in a marsh on Green Island. Recorded by St. John from "Mingan islands: île du Havre" only. Range extension, 122 miles E.

Ligusticum scothicum L.

The Bluff Harbour, August 1, 1927, rocky beach of big island.

Cœlopleurum lucidum (L.) Fernald.

Wapitagun, July 15, 1927, turfy hilltop on island. St. Mary Islands, July 24, 1927, turfy slope on western island.

Heracleum lanatum Michx.

St. Mary Islands, July 22, 1927, damp vale at head of cove on eastern island.

Conioselinum chinense (L.) B.S.P.

Betchewun, August 26, 1928, field. Natashquan, August 7, 1927.

**Angelica laurentiana* Fernald.

St. Mary Islands, July 22, 1927, beach just above rocky shore of middle island. St. Augustin Island, July 19, 1928, damp, rich soil. Frequent on outer islands and promontories. Fernald (1928) cites several collections from points on the north shore of the Gulf of St. Lawrence.

CORNACEÆ

Cornus canadensis L.

Whale Head, July 10, 1927, turfy bank at James Mauger's harbour.

**Cornus canadensis* L., var. *intermedia* Farr.

Bradore Bay, June 30, 1927, mossy woods on granitic rock near head of bay.

Cornus suecica L.

Bradore Bay, June 28, 1927, wet, gravelly hillside on calcareous sandstone. In 1928 first found in bloom at The Bluff Harbour on June 22.

Cornus stolonifera Michx.

Betchewun, August 26, 1928, bush in clearing. Kegaska, August 15, 1928, thicket back of mussel-shell beach on Kegaska Island.

ERICACEÆ

Moneses uniflora (L.) Gray.

Natashquan, August 9, 1927, shady, open woods, and June 27, 1928, border of pond in sandy woods. Wolf Bay, August 13, 1927, beside path in coniferous woods. Cove near Rapide Lessard, Little Rigolet, July 20, 1928, mossy forest floor in coniferous woods.

Pyrola minor L.

Thunder River, September 2, 1928, shaded, grassy bank of rivulet in mixed woods. Not recorded by St. John west of Mingan Islands. Range extension, 27 miles W.

**Pyrola secunda* L.

Mingan, August 31, 1928, border of sandy woodland road. Natashquan, August 9, 1927, white spruce woods on sand dunes. Recorded by D. N. Saint-Cyr from Eskimo Island, but placed in a hypothetical category by St. John, because of confusion of records accompanying Saint-Cyr's specimens. Recorded from an indefinite locality ("depuis Godbout jusqu'à Moisie") by Lemay (1923).

Pyrola secunda L., var. *obtusata* Turcz.

Ste. Genevieve Island, August 23, 1928,

shaded, mossy bank just above shore. Blanc Sablon, August 26, 1927, wooded hollow beside falls of Blanc Sablon River, west side of river. Not recorded by St. John east of Mingan Islands. Range extension, 285 miles E.

**Pyrola chlorantha* Sw.

Mingan, August 30, 1928, just within border of coniferous woods on south side of Ile du Havre. Recorded by D. N. Saint-Cyr from Ile Ste. Genevieve and Ile aux Calculeaux (Gun Island), but placed in a hypothetical category by St. John, because of confusion of records accompanying Saint-Cyr's specimens.

Pyrola asarifolia Michx., var. *incarnata* (Fisch.) Fernald.

Betchewun, June 3, 1928, roadside in coniferous woods. Ste. Genevieve Island, August 23, 1928, top of limestone shingle beach.

Monotropa uniflora L.

Natashquan, August 11, 1927, in decayed sphagnum and lichens on shaded rim of a depression on a granitic crest. Wolf Bay, August 13, 1927, beside path in coniferous woods. Aylmer Sound, August 18, 1927, beneath low branches of dwarf conifers.

Monotropa Hypopitys L.

Wolf Bay, August 13, 1927, beside path in coniferous woods Not recorded by St. John east of "Ile Ste. Genevieve". Range extension, 128 miles E.

Ledum grœnlandicum Oeder.

Lake Island, July 18, 1927, border of woods on tundra. Mutton Bay, July 9, 1927, sloping hillside. Generally distributed. In 1928 first seen in flower at Kegaska River, on June 23.

Rhododendron canadense (L.) B.S.P.

Mainland west of Net Island, July 5, 1927, sheltered hollows on hillside. Generally distributed, but rarer near the eastern end of the coast. In 1928 first found in bloom at Coacoacho on June 19.

Loiseleuria procumbens (L.) Desv.

Lake Island, June 13, 1928, exposed granitic crests. Mistanoque Island, June 24, 1927, bare, rocky, granitic crest. Bradore Bay, June 28, 1927, turfy hillside on calcareous sandstone.

**Phyllodoce cærulea* (L.) Bab.

Bradore Bay, June 30, 1927, quartz slope near head of bay, On July 22, 1929, this species was found to be common, particularly in gullies and ravines, between the head of Bradore Bay and Mount Cartier, which is situated about five miles northeastward from the head of the bay. Reported as hypothetical by St. John.

Kalmia angustifolia L.

The Bluff Harbour, August 1, 1927, turfy hillside. Wolf Bay, August 13, 1927, mossy wood-road. La Tabatière, July 21, 1928, open, coniferous woods.

Kalmia polifolia Wang.

Mutton Bay, July 9, 1927, wooded hollow. Bradore Bay, June 28, 1927, wet, boggy hilltop on calcareous sandstone, and June 30, 1927, bushy tundra at head of bay. Generally distributed. In 1928 first found in bloom at Coacoacho on June 19.

Andromeda glaucophylla Link.

Mutton Bay, July 9, 1927, damp turf on granite. Dukes Island, July 7, 1928, turfy slope. Bradore Bay, June 28, 1927, wet, boggy hilltop on calcareous sandstone. Generally distributed.

Chamædaphne calyculata (L.) Moench.

Natashquan, May 24, 1928, in bloom. Bragg's Harbour, June 11, 1927, bog-covered island. Harrington Harbour, June 20, 1927, boggy turf on granite. Bradore Bay, June 28, 1927, damp earth among low fir and spruce on calcareous sandstone. Generally distributed.

**Epigæa repens* L.

Seven Islands, September 7, 1928, on dry, flat, sandy land, among *Pinus Banksiana*. Its presence here has been previously recorded by the writer. (Lewis, 1926). A record for this plant at an indefinite locality ("depuis Godbout jusqu'à Moisie") was published by Lemay (1923), and doubtless deserves to stand, in spite of adverse comment of St. John (1925).

Arctostaphylos Uva-ursi (L.) Spreng., var. *coactilis* Fernald & MacBride.

Seven Islands, September 7, 1928, upper border of sandy beach. Mingan, August 31, 1928, sandy roadside. St. Genevieve Island, August 23, 1928, top of solid limestone shore.

Arctostaphylos Uva-ursi (L.) Spreng., var. *adenotricha* Fernald & MacBride.

Betchewun, June 5, 1927, open limestone area near shore.

Arctostaphylos alpina (L.) Spreng.

St. Charles Island, August 2, 1930, talus below limestone cliff. The Bluff Harbour, June 14, 1927, shallow turf on granite island. Harrington Harbour, August 1, 1928, rocky hillside.

Chiogenes hispidula (L.) T. & G.

Kegaska, August 14, 1928, stump in clearing in coniferous woods. Bradore Bay, June 30, 1927, mossy woods. Generally distributed.

Vaccinium pennsylvanicum Lam.

Mascanin, August 20, 1928, cleft in exposed granite. Pointe au Maurier, July 13, 1927, wooded hollow in tundra. Bradore Bay, June 30, 1927, mossy woods.

Vaccinium pennsylvanicum Lam., var. *myrtilloides* (Michx.) Fernald.

Magpie, September 1, 1928, thicket in open, sandy woods. Reported by St. John from "Natashkwan" only. Range extension, 119 miles W.

Vaccinium pennsylvanicum Lam., var. *angustifolium* (Ait.) Gray.

Mutton Bay, July 9, 1927, crack in granite cliff. Mainland west of Net Island, July 5, 1927, upper border of wooded valley. Bradore Bay, June 28, 1927, damp earth among low fir and spruce on calcareous sandstone.

Vaccinium uliginosum L., var. *alpinum* Bigel.

Mistanoque Harbour, June 24, 1927, bare, rocky hill-crest. Blanc Sablon, July 11, 1928, tundra on gneiss plain, east side of river. Recorded by St. John as *Vaccinium uliginosum* L.

Vaccinium uliginosum L., var. *pubescens* Lange.

Bradore Bay, June 28, 1927, turfy hillside on calcareous sandstone.

Vaccinium Vitis-idæa L., var. *minus* Lodd.

Lake Island, July 18, 1927, level turf. La Tabatière, July 7, 1927, rocky crest.

Vaccinium Oxycoccos L.

Lake Island, July 18, 1927, sphagnum bog. Pointe au Maurier, July 13, 1927, wet sphagnum on rock near shore.

DIAPENSIACEÆ

Diapensia lapponica L.

Bragg's Harbour, June 11, 1927, bog-covered island. Bradore Bay, June 28, 1927, wet, boggy hilltop on calcareous sandstone.

PLUMBAGINACEÆ

**Armeria labradorica* Wallr., var. *submutica* Blake, f. *glabriscapa* Blake.

Greenly Island, July 6, 1930, turfy bank.

PRIMULACEÆ

Primula laurentiana Fernald.

Seven Islands, September 12, 1928, small limestone island (Caye à Chaux), close northeast of Manowin Island. Betchewun, June 6, 1927, grassy open area on Gun Island. Kegaska, June 23 1928, mussel-shell detritus near shore of Green Island. Fog Island, August 9, 1928, turfy slope. Wapitagun, July 14, 1927, grassy area near shore of Matchiatik Island. St. Augustin, July 19, 1928, shallow turf on granitic island in the group of islands called St. Augustin Square. Recorded by St. John as *Primula farinosa* L., and varieties *macropoda* Fernald and *incana* (M. E. Jones) Fernald. The Wapitagun collection has been cited by M. L. Fernald (1928).

**Primula laurentiana* Fernald, f. *chlorophylla* Fernald.

St. Mary Islands, July 27, 1927, wet, mossy swale on Puffin Island, close to Cliff Island. Cited by M. L. Fernald (1928).

Primula egaliksensis Wormskj.

St. Charles Island, August 2, 1930, talus below limestone cliff. St. Mary Islands, July 22, 1927, gravelly patch at top of rock shore on middle island, and July 23, 1927, small patches of vegetation close to shore on middle island. St. Augustin, July 19, 1928, common in thin, mossy turf near shore of islands in the group of islands called St. Augustin Square. Recorded by St. John (as *P. egalliccensis* Wormskj. ex Lehman) from "Charnay: pointe au Maurier, mossy bank on island off" only. Range extension 158 miles W. and 81 miles E. These collections from St. Mary Islands are cited by M. L. Fernald (1928), who at the same time cites collections by Frère Marie-Victorin and Frère Rolland from several points in the region of the Mingan Islands, including St. Charles Island.

Androsace septentrionalis L., var. *robusta* St. John.

Ste. Genevieve Island, June 17, 1929, crevices in limestone boulder on upper margin of beach. Collected by E. C. Abbe.

Lysimachia terrestris (L.) B.S.P.

Kegaska, August 14, 1928, sedgy bank of sheltered cove. Wolf Bay, August 7, 1928, in 4 inches of water in pond near houses. Harrington Harbour, September 1, 1927, in 1 inch of water near margin of shallow pond. Not recorded by St. John east of "rivière Etamamiou". Range extension, 28 miles E.

Trientalis borealis Raf.

Bradore Bay, June 30, 1927, in mossy woods near head of bay. Generally distributed.

Glaux maritima L., var. *obtusifolia* Fernald.

Lake Island, July 29, 1927, upper part of sheltered, marshy, salt water shore. Aylmer Sound, August 18, 1927, bare mud in brackish marsh, west side of Little Mecatina Island. Not recorded by St. John east of "Charnay: pointe au Maurier". Range extension, 26 miles E.

(*To be continued*)

CHRISTMAS BIRD CENSUS RETURNS

COMOX, VANCOUVER ISLAND, B.C.—(Courtenay to Point Holmes). 1st and 2nd January, 1932. Very dull, wind light easterly. Temperature around 45°. Distance 10 miles, mainly along river and shore line. Guthrie and Pearse together, Laing alone. Owing to stormy weather and bad light impossicle to complete area in one day. Weather for some time previous very stormy with wind and rain. The Hepburn's Rosy Finches (together) were studied at range of a few feet.

Lesser Loon, 20*; Pacific Loon, 20*; Red-throated Loon, 1; Holboell's Grebe, 6; Horned Grebe, 60; Western Grebe, 100*; Pelagic Cormorant, 10; Northwestern Coast Heron, 9; Common Canada Goose, 9; Common Mallard, 250*; Baldpate, 95; Greater Scaup Duck (chiefly) and Lesser Scaup Duck, 1000; American Golden-eye, 700*; Barrow's Golden-eye, 5; Buffle-head, 100*; Western Harlequin Duck, 24; White-winged Scoter, 2500*; Surf Scoter, 1500*; American Scoter, 100*; Hooded Merganser, 3; American Merganser, 5; Red-breasted Merganser, 22; Sharp-shinned Hawk, 1; Cooper's Hawk, 1; Northern Bald Eagle, 1; Oregon Ruffed Grouse, 1; California Quail, 1; Ring-necked Pheasant, 4; American Coot, 23; Killdeer, 40; Red-backed Sandpiper, 150*; Sanderling, 1; Glaucous-winged Gull, 500*; Herring Gull, 1; Short-billed Gull, 400*;California Murre, 25; Belted Kingfisher, 4; Northwestern Flicker, 20; Harris' Woodpecker, 2; Gairdner's Woodpecker, 1; Steller's Jay, 2; Northern Raven, 2; Northwestern Crow, 250; Chestnut-backed Chickadee, 60*; Red-breasted Nuthatch, 1; Creeper (subsp.), 1; Western Winter Wren, 22; Seattle Wren, 19; Western Robin, 60; Pacific Varied Thrush, 3; Eastern Golden-crowned Kinglet, 35*; Western Ruby-crowned Kinglet, 1; Cedar Waxwing, 1; Northwestern Shrike, 1; English Sparrow, 2*; Western Meadowlark, 6; Western Evening Grosbeak, 7; California Purple Finch, 100*; Hepburn's Rosy Finch, 2; Northern Pine Siskin, 120*; Oregon Towhee, 29; Oregon Junco, 300*; Sooty Fox Sparrow, 4; Rusty Song Sparrow, 18. Total: 65 species, 8761 individuals. —D. GUTHRIE, THEED PEARSE, H. M. LAING.

QUALICUM BEACH, VANCOUVER ISLAND, B.C.—December 25, 1931. Latter half of afternoon, along shore-line from southern point of Qualicum Beach to and including Little Qualicum River tide-flats. Weather bleak, with strong N.E. wind and a drizzling rain, but no snow. Visibility Eigpoor. ht-power binoculars used. A poor, though representative, census.

Loon (sp.), 5; Horned Grebe, 16; Brandt's Cormorant, 1; Northwestern Coast Heron, 1; Black Brant, 4; Common Mallard, 2; Baldpate, 3; Green-winged Teal, 6; Greater Scaup Duck, 40; American Golden-eye, 62; Buffle-head, 60; White-winged Scoter, 35; Surf Scoter, 67; American Scoter, 39; Red-breasted Merganser, 3; Black Turnstone, 5; Glaucous-winged Gull, 222; Herring Gull (juveniles), 4; Short-billed Gull, 191; Northwestern Flicker, 2; Steller's Jay, 1; Northwestern Crow, 56; Chestnut-backed Chickadee, 18; Western Winter Wren, 2; Seattle Wren, 1; Pacific Varied Thrush, 2; Western Golden-crowned Kinglet, 6; Eastern Ruby-crowned Kinglet, 1; Northwestern Red-wing, 2; Brewer's Blackbird, 30; Northern Pine Siskin, 20; Oregon Towhee, 2; Oregon Junco, 11; Sooty Fox Sparrow, 4; Rusty Song Sparrow, 8. Total: 35 species, 932 individuals.—ARTHUR PEAKE.

SUMMERLAND, OKANAGAN LAKE, BRITISH COLUMBIA, December 20, 1931, from 8 a.m. to 4 p.m. Cloudy. No wind. Average tempearture 36°. 9 inches of snow in hills, none on lake-front nor benches. Penticton marsh on foot. By car from Penticton to Trout Creek Point, along lake-shore, 7 miles. Thence on foot 4 miles of lake front, adjoining fruit benches back to pine-clad hills, being the municipality of Summerland and Experimental Station. Observers in three groups.

Loon (sp.), 1; Horned Grebe, 9; Common Mallard, 8; Redhead, 150; Canvas-back, 2; Greater Scaup Duck, 6; American Golden-eye, 5; Buffle-head, 14; Red-breasted Merganser, 2; Pigeon Hawk, 1; California Quail, 423; Ring-necked Pheasant, 86; American Coot, 1500; Killdeer, 3; Wilson's Snipe, 3; Herring Gull, 8; Short-eared Owl, 1; Eastern Belted Kingfisher, 5; Northwestern Flicker, 48; Hairy Woodpecker, 1; Batchelder's Woodpecker, 4; Black-headed Jay, 2; American Magpie, 45; Raven, 2; Long-tailed Chickadee, 73; Mountain Chickadee, 24; Slender-billed Nuthatch, 4; Pygmy Nuthatch, 4; Dipper, 2; Western Winter Wren, 1; Tule Wren, 6; Townsend's Solitaire, 1; Western Golden-crowned Kinglet, 3; Bohemian Waxwing, 235; Northwestern Shrike, 5; English Sparrow, 50; Red-winged Blackbird, 203; Brewer's Blackbird, 50; Western Evening Grosbeak, 19; Common Redpoll, 92; Pale Goldfinch, 270; Shufeldt's Junco, 500; Western Tree Sparrow, 2; Rusty Song Sparrow, 90. Total: 44 species, 3863 individuals. —ERIC M. TAIT, HERBERT M. SIMPSON, T.

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* Estimated. Number probably greater.

YOUNG, JR., AUBREY BEGGS, S. A. LIDDELL.

CAMROSE, ALBERTA.—(To Battle River and return). December 26, 10.30 a.m. to 4.30 p.m. Clear. 5 inches of snow, wind east, temperature at start zero, 2° above at return. Eighteen miles by car and six on foot. Observers generally in two parties.

Gray Ruffed Grouse, 5; Prairie Sharp-tailed Grouse, 1; European Partridge, 25; Arctic Horned Owl, 1; Montana Horned Owl, 1; Short-eared Owl, 12; Northern Pileated Woodpecker, 1; Hairy Woodpecker, 2; Downy Woodpecker, 1; Northern Blue Jay, 5; American Magpie, 15; Long-tailed Chickadee, 20; Brown Creeper, 6; Eastern Golden-crowned Kinglet, 1; Evening Grosbeak, 1; Pine Grosbeak, 50; Hoary Redpoll, 5; Common Redpoll, 100. Total: 17 species (one represented by two subspecies), about 252 individuals. On December 24th, Messrs. McGregor and Twomey saw 1 American Rough-legged Hawk, about 25 Eastern Golden-crowned Kinglets and 2 Tree Sparrows. This is the first winter record of Kinglet and Tree Sparrows.—FRANK L. FARLEY, ARTHUR TWOMEY, HUGH MCGREGOR, FRANK ARMSTRONG, VERNON CRAIG, CAL KNOX and LOUIE FRANCOEUR.

EAST BAY, LAKE DAUPHIN, MAN.—December 25. Very mild, temperature above freezing point; 6 inches of fresh snow.

Ruffed Grouse, 4; Prairie Sharp-tailed Grouse, 27; Northern Pileated Woodpecker, 1; Eastern Hairy Woodpecker, 3; Northern Blue Jay, 3; Black-capped Chickadee, 12; White-breasted Nuthatch, 1; Eastern Evening Grosbeak, 5; Canadian Pine Grosbeak, 29. Total: 9 species, 85 individuals. A Western Meadowlark and a White-throated Sparrow with a broken leg are wintering here. A European Partidge was seen on the 10th.—EDWARD ROBINSON.

WINNIPEG AND SURROUNDING MUNICIPALITIES, MAN.—December 27, 1931. 18 observers in 10 parties in different directions. Cloudy to bright; light variable wind; 3 inches of snow underfoot; temperature, 30° to 34°.

Ruffed Grouse, 4; Prairie Sharp-tailed Grouse, 34; Ring-necked Pheasant, 1; Snowy Owl, 2; Eastern Hairy Woodpecker, 3; Northern Downy Woodpecker, 5; Red-headed Woodpecker, 1; Northern Blue Jay, 41; Black-capped Chickadee, 122; White-breasted Nuthatch, 40; Bohemian Waxwing, 28; Eastern Evening Grosbeak, 13; Canadian Pine Grosbeak, 37; Common Redpoll, 10; Eastern Snow Bunting, 2. Total: 15 species, 343 individuals.

Natural History Society of Manitoba: R. M. BLAKELY, C. L. BROLEY, B. W. CARTWRIGHT, J. CARTWRIGHT, J. CLARK, J. C. COLLINSON, R. FRYER, R. L. HOLIDAY, J. KENNEDY, A. G. LAWRENCE, N. LOWE, A. MACKIE, T. MCCARTHY, A. W. MURDOCH, H. C. PEARCE, R. RANKIN, F. J. ROGERS, M. R. WATT.

Comment: The seven Winnipeg censuses clearly show the decline and gradual increase in numbers of the Prairie Sharp-tailed Grouse. In 1925, 21 were recorded; 1926, 8; 1927 and 1928, 0; 1929, 6; 1930, 9; 1931, 34. White-breasted Nuthatches show an almost continuous increase since 1925, when 9 were noted, rising to 40 in 1931. Black-capped Chickadees fluctuated in the seven years as follows: in 1925, 42; 1926, 48; 1927, 16; 1928, 20; 1929, 33; 1930, 86; and 1931, 122. Northern Blue Jays also show a steep decline and increase, varying from 45 in 1925 to 18 in 1928, and 41 in 1931. On the other hand, Northern Downy and Eastern Hairy Woodpeckers were present in the usual small numbers.

After an absence of five years from the bird census, Bohemian Waxwings were seen by four parties but Eastern Snow Buntings, usually common winter visitors, were observed by only one party. No Canada Jays were found, although they were recorded in each of the last three censuses. The Northern Shrike, American Hawk Owl and Eastern Goshawk were also absentees.

The only summer resident located was a Red-headed Woodpecker which is wintering (for the first time observed in Manitoba) in a telephone pole in Winnipeg. On January 3 a White-throated Sparrow, and on the 5th, a Slate-coloured Junco, were reported wintering on the river bank.—A. G. LAWRENCE.

HAMILTON, ONTARIO.—December 26, 1931. 9 a.m. to 5 p.m. Clear; light northwest wind; temperature 22° at 9 a.m., 28° at noon, 27° at 5 p.m. Ground bare, Bay open. Combined list of 14 observers, working in 7 parties, covering Burlington Bay, Dundas Marsh, and the escarpment west to Ancaster.

Horned Grebe, 2; Common Mallard, 3; Black Duck, 63; Green-winged Teal, 2; Redhead, 2; Canvas-back, 1; Greater Scaup Duck, 460; American Golden-eye, 266; Old-squaw, 3; White-winged Scoter, 1; Hooded Merganser, 2; American Merganser, 2; Northern Red-shouldered Hawk, 1; Eastern Sparrow Hawk, 1; Canada Ruffed Grouse, 1; Ring-necked Pheasant, 4; American Coot, 2; Herring Gull, 1900+; Ring-billed Gull, 250+; Bonaparte's Gull, 100; Eastern Hairy Woodpecker, 6; Northern Downy Woodpecker, 17; Northern Blue Jay, 14; Black-capped Chickadee, 75; White-breasted Nuthatch, 21; Brown Creeper, 4; Eastern Robin, 1; Eastern

Golden-crowned Kinglet, 1; Bohemian Waxwing, 1 (brown under tail-coverts and other points noted); Cedar Waxwing, 100; Starling, 138; English Sparrow, 550+; Bronzed Grackle, 1; Eastern Purple Finch, 3; Northern Pine Siskin, 3; Eastern Goldfinch, 20; Slate-coloured Junco, 157; Eastern Tree Sparrow, 170; Eastern Song Sparrow, 10; 1200+ Ducks in centre of Bay, too far away to be identified. Total: 39 species, 5,558+ individuals. During the past week the following additional species have been seen: Gadwall, 3; Baldpate, 4; American Pintail, 6; Red-breasted Merganser, 7; American Rough-legged Hawk, 1; Eastern Screech Owl, 1; Eastern Crow, 1; Eastern Winter Wren, 1; Eastern Cardinal, 1; Eastern Fox Sparrow, 1 (Dr. McM.).

Other species seen since census day are as follows: December 29, Eastern Mourning Dove, 52; December 31, Great Blue Heron, 1; White-throated Sparrow, 1; January 3, American Scoter, 2; Killdeer, 1; Glaucous Gull, 1; Great Black-backed Gull, 6; Eastern Belted Kingfisher, 1; Prairie Horned Lark, 1; Eastern Red-wing, 2; January 4, Ring-necked Duck, 13; Lesser Scaup Duck (*number?*—ED.); Marsh Hawk, 1; Iceland Gull, 1. A Sharp-shinned Hawk was seen by Dr. McMillan.

The number of ducks on Burlington Bay, January 3rd and 4th, 1932, was as follows: Common Mallard, 25; Red-legged and Common Black Duck, 500; Gadwall, 3; Baldpate, 9; American Pintail, 3; Redhead, 9; Ring-necked Duck, 13; Canvas-back, 6; Greater Scaup Duck, 500; Lesser Scaup Duck, at least a few; American Golden-eye, 100; American Scoter, 2; Hooded Merganser, 3; American Merganser, 20; Red-breasted Merganser, 15.

H. CARL NUNN, C. MCQUESTION, R. HAIST, ROGER NUNN, C. A. HEAVEN, DR. G. O. MCMILLAN, MRS. MCMILLAN, J. H. WILLIAMS, M. JOHNSTON, MRS. F. E. MACLOGHLIN, MRS. J. G. FARMER, MISS E. MCEWIN, MISS G. BAUER, G. W. NORTH (*Hamilton Bird Protection Society, Inc.*).

LONDON, ONTARIO.—*McIlwraith Ornithological Club.*—The McIlwraith Ornithological Club went out for the Census trip on Saturday, December 26th. The weather for some days preceeding Christmas had been very mild and rainy, but on the night of the 24th it turned very much colder and all Christmas day a bitter north-west wind blew filling us with misgivings both as to birds and weather for our outing on the 26th. We were delighted, however, to find in the morning that although the air was cold and snappy, there was practically no wind, while a clear sky and hard, bare ground made both observation good and walking a pleasure. We were well organized and all districts surrounding the city were pretty well covered so that the list of birds seen is about as complete as is possible from a one day's census.

Three cars loaded with an even dozen eager and energetic observers left the city (London) at 8 a.m. to drop parties at intervals along the road to Delaware, some fourteen miles west, the idea being thoroughly to cover the valley of the Thames River between Wonnacott's farm and the city. At Byron bridge, Messrs. Harry, Will and Frank Girling were dropped. They walked through Springbank Park and along the street railway tracks to the coves, listing twenty species and doing a splendid piece of work. They had many of the birds along this stretch already located and not only succeeded in finding them (one being the Chewink or Red-eyed Towhee), but also got a Yellow-bellied Sapsucker (quite a rarity in winter), and a Pied-billed Grebe, the latter being the first winter record for the species for the county. The next stop was Kilworth where six got off: Messrs. W. E. Saunders, Verne Franks and Douglas Clark starting east towards Byron, while Messrs. Dale, Bob McLeod and Jack Watson walked west to Komoka bridge. The second party got an Eastern Mourning Dove, while together they accounted for most of the American Mergansers, American Golden-eyes and Herring Gulls, which were quite numerous along the river. The three remaining members of the party: Messrs. Eli Davis, J. C. Higgins and T. D. Patterson, then proceeded to Wonnacott's farm, one of the most delightful spots, from the viewpoint of a naturalist, in the London district. They made the second largest list for the day, nineteen, including a pair of Bald Eagles, one Northern Red-shouldered Hawk and one Eastern Red-tailed Hawk, four Eastern Winter Wrens and a flock of eight Northern Pine Siskins. While these parties were covering the country south of the river, Mr. J. F. Calvert along with Owen and Will Cousins and Ted Hutchison, scouted around north of the river between Hyde Park and Byron. On Christmas day Mr. Calvert had seen a Catbird near the bridge, but although they tried hard to locate it for the census, they were unable to do so. Mr. and Mrs. E. H. McKone took care of the territory surrounding their home, always a good place for birds, and succeeded in finding fourteen species, including a flock of Cedar Waxwings and also the only Sharp-shinned Hawk for the day. Mr. Roger Hedley looked after the district where he resides (Ilderton) and found two species not recorded by anyone else, a Marsh Hawk and a single Canadian Pine Grosbeak. Marsh Hawks, by the way, have been fairly common this winter.

Five were seen on December 12th, while one's and two's have been noted frequently. Judging by the number of hawks and owls on our list, mice must be abundant, a fact which is borne out by the numbers of these small mammals, field mice, white-footed mice and shrews, caught by one of our members who had a line of traps in a near-by wood.

In the afternoon there was a re-arrangement of some of the parties. The three Girling boys stuck together, however, and on a trip to Watson Street dump and the "Ponds" added two more species to the day's total, *i.e.*, the Northern Shrike and a Ring-necked Duck. The latter was a bird that had been under observation for some time and constitutes our first winter rceord. It was fairly tame and when flushed did not fly far, giving the impression that it may be a left-over from the gunning season. Jack Watson decided to go rabbit hunting instead of birding in the afternoon, but just the same his party scared up in one field a flock of eight Short-eared Owls, one of the most interesting finds of the day. Messrs. C. G. Watson and J. R. McLeod worked close in to the city in the vicinity of the coves and river banks rounding up a number of Song Sparrows and otherwise adding to the grand total. Two other parties in cars scoured around through the country to the north of the city, with American Rough-legged Hawks particularly in mind. Between them they found five, also another Eastern Red-tailed Hawk and two Long-eared Owls.

At sundown half a dozen of the most enthusiastic met at Wonnacott's farm to have supper round the camp fire, and to see if something could not, perhaps, be still added to the list. First of all an Eastern Screech Owl gave its quavering call, which, although not a new species, added one more to the total, and then about 9 p.m., when we had almost given up hope, old Bubo began to hoot, making No. 43 on the list and bringing to an end, if not a perfect day, at least one that had been very enjoyable and highly satisfactory to every one who had taken part in its activities.

Date: December 26, 1931. Temperature: 8 a.m., 15°; 2 p.m., 45°; 10 p.m., 22°. Combined list of thirteen parties, seven working in the morning and six in the afternoon. Sky clear, ground bare and frozen hard. Wind light, N.W. Total observers, twenty-four.

Pied-billed Grebe, 1; Ring-necked Duck, 1; American Golden-eye, 3; American Merganser, 119; Sharp-shinned Hawk, 1; Eastern Red-tailed Hawk, 2; Northern Red-shouldered Hawk, 1; American Rough-legged Hawk, 5; Northern Bald Eagle, 2; Marsh Hawk, 1; Canada Ruffed Grouse, 2; Ring-necked Pheasant, 10; Herring Gull, 22; Eastern Mourning Dove, 1; Eastern Screech Owl, 5; Great Horned Owl, 1; Long-eared Owl, 2; Short-eared Owl, 8; Eastern Belted Kingfisher, 14; Northern Flicker, 3; Yellow-bellied Sapsucker, 1; Eastern Hairy Woodpecker, 6; Northern Downy Woodpecker, 33; Northern Blue Jay, 50; Eastern Crow, 725; Black-capped Chickadee, 157; White-breasted Nuthatch, 23; Brown Creeper, 14; Eastern Winter Wren, 4; Eastern Golden-crowned Kinglet, 54; Cedar Waxwing, 16; Northern Shrike, 1; Starling, 369; English Sparrow (numbers not counted); Eastern Cardinal, 27; Eastern Purple Finch, 20; Canadian Pine Grosbeak, 1; Northern Pine Siskin, 8; Eastern Goldfinch, 33; Red-eyed Towhee, 1; Slate-coloured Junco, 207; Eastern Tree Sparrow, 91; Song Sparrow, 15. Total: 43 species, 2060 individuals, plus English Sparrows.

Eastern Robin seen daily up to the 25th, but could not be located on census day. Bronzed Grackle seen on December 15th; Eastern Bob-white, covey of 18 on December 27th; and Common Mallard and Black Ducks both on December 28th.—E. M. S. DALE, *Chairman Census Committee, McIlwraith Ornithological Club.*

OTTAWA, ONTARIO, December 26, 1931.—Twenty-one observers in ten parties took part in the Christmas Bird Census at Ottawa on December 26. The day was fine and clear, with a brisk northwest wind, and temperature of 4° at 7.30 a.m. and 10° at 6 p.m. It was estimated that in the open 95% of the ground was bare of snow, while in the woods only 5% was bare, the remainder being covered with slightly crusted snow, one to six inches deep.

Despite the excellent conditions for observation and the large number of observers afield, the number of native birds seen was only 739 individuals of 19 species. This includes 3 Common Mallards in Rockcliffe Crown Game Preserve, which were living in a wild state when included in the census, although they had been raised and released locally. The total is small as compared with the numbers seen on the census days in 1929 and 1930, but compares well with earlier years. The great scarcity of cones on the coniferous trees in 1931, which is correlated with an almost complete absence of the birds that habitually feed on the seeds of these trees, and the unusual extent of bare ground in this year, which leads to the scattering of the few ground-feeding birds in the district, are probably responsible to a large extent for the comparatively small number of native birds recorded in this census.

It is of interest to note that the number of Starlings included in the 1931 census (831) is the greatest number of these birds in any Christmas Bird Census at Ottawa up to the present time,

CHRISTMAS BIRD CENSUS AT OTTAWA—DECEMBER 26, 1931.

SPECIES	ROUTES, *as in text*	1	2	3	4	5	6	7	8	9	10	TOTALS
Common Mallard			3									3
American Golden-eye									40	38	5	45
American Merganser			1			1	5				5	12
Eastern Pigeon Hawk			1									1
Canada Ruffed Grouse		2				4		1	1	3	3	14
Northern Pileated Woodpecker											1	1
Eastern Hairy Woodpecker										1		1
Northern Downy Woodpecker		1	2	1		3	2			2		11
Eastern Crow						1	1			3		5
Black-capped Chickadee		15	17		14	16	21		7	71	6	167
White-breasted Nuthatch			5				4			1		10
Red-breasted Nuthatch		2								3		5
Brown Creeper											1	1
Eastern Robin							1					1
Bohemian Waxwing							58					58
Starling			2	200		175	351	50	4	42	7	831
English Sparrow		53	16	200	75	200	90	10	50	213	90	997
Eastern Meadowlark						1						1
Canadian Pine Grosbeak			1									1
Eastern Goldfinch										94		94
Eastern Snow Bunting								306		2		308
Totals of individuals		73	48	401	89	401	533	367	102	473	118	2567
Totals of species		5	9	3	2	8	9	4	5	12	8	21

—HARRISON F. LEWIS.

the next largest number in a local Christmas Bird Census being 608 in 1930. The number of Canada Ruffed Grouse in the present census (14) has been exceeded only in 1926, when the Ottawa census included 16 of this species. The number of American Golden-eyes in the present census (45) has been exceeded in like manner only in 1927, when 50 of these birds were recorded on census day. The number of Black-capped Chickadees in the 1931 census (167) has been exceeded locally only twice, namely, by a record of 194 of this species in 1927 and by a record of 174 of them in 1929. The Eastern Meadowlark appears this year in the Ottawa Christmas Bird Census for the first time.

In addition to the species seen on census day, a Sharp-shinned Hawk was seen by Dr. R. E. DeLury in the Government Arboretum on December 25.

The parties participating and the routes followed in NESW order were: (1) J. D. Soper, W. H. B. Hoare and W. H. J. Hoare, 9 a.m. to 4 p.m., north bank of Ottawa River, Gatineau Point to Buckingham, Quebec, 13 miles by auto, 9 on foot; (2) Hoyes Lloyd, H. A. Lloyd and D. Kemp Edwards, 8.30 a.m. to 4.30 p.m., south bank of Ottawa River, eastward from Rideau Gate to Ottawa airport, including Village of Rockcliffe Park and property of Federal District Commission, 13 miles on foot; (3) R. M. Anderson and G. S. Postlethwaite, 9.30 a.m. to 11.30 a.m., Ottawa East, including refuse dump, and north bank of Rideau River to Billing's Bridge, 4 miles on foot; (4) R. Sternberg and Wm. Dore, 9 a.m. to 3 p.m., south along Metcalfe Road and vicinity, east of route (5), 10 miles by auto, 10 on foot; (5) C. M. Sternberg and C. E. Johnson, 9 a.m. to 3 p.m., Bronson Avenue, south to White's Bridge, along C.P.R. track 5 miles to Metcalfe Road and return on it, 10 miles on foot; (6) R. E. DeLury, 8.15 a.m. to 11.15 a.m., Experimental Farm, Rideau Canal and river to Hog's Back and return, 6 miles on foot; (7) W. H. Lanceley and W. Bray, 10 a.m. to 3.30 p.m., to Hog's Back and Black Rapids and return, 10 miles by auto, 5 on foot; (8) B. A. Fauvel, 10.30 a.m. to 4 p.m., south bank of Ottawa River, from Ottawa west to Britannia, 10 miles on foot; (9) R. Lockwood, Harlow Wright and S. Hennessey, 9.25 a.m. to 5.10 p.m., north bank of Ottawa River, Breckenridge to Deschenes, Quebec, 15 miles on foot; (10) Harrison F. Lewis and K. A. McElroy, 8.45 a.m. to 4.30 p.m., Ottawa to Wrightville, Que., to Fairy Lake, to Gatineau River at Farmer's Rapids, across river and 3 miles N.E., returning to Ottawa via Ironside and Wrightville, 6 miles by street-car, 15 on foot.

The results of the census are shown in the

accompanying table. It should be noted that the 38 American Golden-eyes seen on the Ottawa River by party No. (9), from the Quebec side, are presumed to form part of the 40 birds of this species seen at the same place by party No. (8), from the Ontario side, and consequently the 38 Golden-eyes seen by party No. (9) are omitted from the general totals.

OMEMEE, ONTARIO, December 27, 1931.—Wind southeast, light. Cloudy. About 1 inch of snow. Temperature about 10°-30°. Time: 7.40 a.m. to 4.30 p.m.

Canada Ruffed Grouse, 11; Eastern Screech Owl, 1; Great Horned Owl, 3; Northern Pileated Woodpecker, 1 (here since September); Eastern Hairy Woodpecker, 5; Northern Downy Woodpecker, 4; Northern Blue Jay, 5; Black-capped Chickadee, 10; Eastern Golden-crowned Kinglet, 5; English Sparrow, many; Eastern Evening Grosbeak, 6; Eastern Goldfinch, 10; Eastern Tree Sparrow, 3; Eastern Snow Bunting, about 160. Total: 14 species, about 224 individuals, plus English Sparrows. Other species observed recently: 23th, Canada Jay; 25th, Eastern Crow and Starling; 21st, White-breasted Nuthatch, Brown Creeper and Canadian Pine Grosbeak; 18th, Great Blue Heron; 16th, Long-eared Owl and Common Redpoll; 14th, Northern Pine Siskin; 13th, Black Duck and American Golden-eye; 29th, Eastern Robin; 30th, Eastern Winter Wren.—E. W. CALVERT.

PAKENHAM, ONTARIO, December 26th, 1931.—Clear sky, strong northwesterly winds, 1 inch of snow. Temperature, 2° above zero in the morning and 12° above in the afternoon. 9 a.m. to 3.45 p.m. Twenty-five miles on foot. Observers separate.

Canada Ruffed Grouse, 20; Eastern Hairy Woodpecker, 2; Northern Blue Jay, 1; Black-capped Chickadee, 42; White-breasted Nuthatch 10; Brown Creeper, 1; Starling, 18; Common Redpoll, 12; Eastern Snow Bunting, 53+. Total: 9 species, 159 individuals.—VERNA M. ROSS, EDNA G. ROSS, ALLAN F. ROSS, WILMER ROSS.

THE BRODIE CLUB, TORONTO, ONTARIO, December 27th, 1931.—An unusually mild season and the absence of snow seems to be reflected in the following list of birds recorded by the Brodie Club of Toronto in their 7th Christmas bird census held on December 27th, 1931. Indications of the weather's influence may be noted both in the high percentage of species normally wintering farther south and in the large number of individuals of species usually found here sparingly, such as Eastern Crow and Song Sparrow. On the other hand, the Eastern Evening Grosbeak and White-winged Crossbill appear for the first time, showing how dangerous it is to draw hasty conclusions in matters of this kind.

On Census day there was no snow on the ground but it had been fairly cold since December 25th and small bodies of water were frozen quite firmly. Toronto Observatory readings gave maximum and minimum temperatures as 31 and 18 degrees above zero. The wind was from the north and northeast, varying from 4 to 8 miles and the sky was cloudy. It might be worth mentioning that on Christmas Eve at Toronto there was a short electrical storm.

Thirty observers contributed to the list and eight parties were in the field between 7.30 a.m. and 3 p.m., working as follows: 1. G. Bell, E. J. Deacon, R. J. Rutter; 2. L. L. Snyder, T. F. McIlwraith, E. B. S. Logier; 3. C. E. Hope, H. Stovell, Mrs. O. S. Mitchell; 4. J. L. Baillie, T. M. Shortt, R. V. Lindsay, L. J. Milne; 5. P. Harrington, F. A. E. Starr, A. E. Allin; 6. S. L. Thompson, H. Richardson, M. Speirs, D. Sumner, J. McBean, S. Downey, J. Greenwood; 7. J. Townson; 8. F. Emery, H. H. Brown, H. Macklin, C. Richards, A. F. Coventry, D. McLulich. The routes were the same as last year, but two were added. Number 7 covers the eastern lake shore to Scarboro Bluffs and it is intended for future occasions that this shall extend as far east as Highland Creek. Number eight extends north to Kettleby in King Township and includes intervening territory. It should also be mentioned that number four route includes Sunnyside Beach and number five extends along the lake shore from the centre of the city to Port Credit and northward from there to Erindale, while Toronto Island is included in number six. It is proposed to standardize these routes for all future Christmas censuses as they are given in *The Canadian Field-Naturalist* of February, 1931, and in this issue.

The following species appear on the Christmas census list for the first time: Horned Lark, American Pipit, Eastern Red-wing, Eastern Evening Grosbeak, White-winged Crossbill.

Other birds seen during December, 1931, at Toronto, but not on census day, include: Canvasback, Scaup, Bufflehead, Eastern Screech Owl, Eastern Belted Kingfisher, Eastern Hermit Thrush, Eastern Bluebird, Common Redpoll, Eastern Vesper Sparrow, White-throated Sparrow and Eastern Snow Bunting.—THE BRODIE CLUB, R. J. RUTTER, *Secretary*.

VINELAND, ONTARIO, December 24th, 1931.—The territory covered in this census was nearly the same as that traversed in previous years and comprised lake shore, marsh, fields and wood lots.

CHRISTMAS CENSUS OF THE BRODIE CLUB, TORONTO—DECEMBER 27, 1931

SPECIES: PARTIES:	1	2	3	4	5	6	7	8	TOTALS
Horned Grebe						1			1
American Golden-eye				18	29	8			55
Old-squaw				34	126	100	25		285
American Merganser				4	4	10	5		23
Eastern Red-tailed Hawk		1							1
American Rough-legged Hawk		2							2
Eastern Sparrow Hawk						1			1
Canada Ruffed Grouse								13	13
Ring-necked Pheasant			1	2		1		1	5
Great Black-backed Gull					1	1			2
Herring Gull				75	150	50			275
Ring-billed Gull					150	6			156
Great Horned Owl								2	2
Northern Flicker		1							1
Eastern Hairy Woodpecker								7	7
Northern Downy Woodpecker	2	2	5	16		1			26
Horned Lark						8			8
Northern Blue Jay		5	2	4				3	14
Eastern Crow	1	7	1	4	2	1			16
Black-capped Chickadee	10	9	12	40	5	3	2	55	136
White-breasted Nuthatch	2	3	5	17					27
Brown Creeper	2		1	4					7
Eastern Winter Wren	1								1
Eastern Robin						1			1
Eastern Golden-crowned Kinglet	3		6					1	10
American Pipit	1								1
Northern Shrike		1				1			2
Starling	7	35	66	85	210	100		5	508
English Sparrow				ABUNDANT					
Eastern Meadowlark			2						2
Eastern Red-wing						8			8
Rusty Blackbird						5			5
Eastern Cardinal			1						1
Eastern Evening Grosbeak								7	7
Canadian Pine Grosbeak								2	2
White-winged Crossbill								2	2
Northern Pine Siskin			30	1					31
Eastern Goldfinch			8						8
Slate-coloured Junco	6	40	16	22	12		5	20	121
Eastern Tree Sparrow		12	10	145	25	4		1	197
Song Sparrow		1	6	10		2			19
Totals	35	119	172	481	714	312	37	119	1989
Total number of species									41

About six miles were covered by automobile and two and a half miles on foot.

The trip was started at 9.20 a.m., and finished before 1 p.m. The day was very foggy and dull, turning to rain just as we were ready to go home. The ground was muddy and many plants were green in the fields. The temperature was from 42° to 46°.

Large Grebe (sp.), 1; Duck (sp.), 1; Ring-necked Pheasant, 26 (including one partial albino); Herring (?) Gull, 1; Northern Blue Jay, 4; Eastern Crow, 7; White-breasted Nuthatch, 4; Eastern Winter Wren, 1; Eastern Mockingbird, 1; English Sparrow, numerous; Redpolls or Eastern Goldfinches, about 12; Slate-colored Junco, 53; Eastern Tree Sparrow, 50; Eastern Song Sparrow, 4. Total: 14 species, about 165 individuals, plus English Sparrows.

A few notes on the Mockingbird may be of interest. This wanderer from the south appeared in the shrubbery of the Horticultural Experimental Station at Vineland about the middle of November. It was at first thought to be a Shrike. However, on December 5th, its real identity was discovered and it has been a source of great interest to our local bird students.

On December 18th it was observed for a time by some of us in the company of Mr. R. W. Sheppard of Niagara Falls, Ont., who said it was of a more sooty gray than those he had seen in the southern States. The bird was quite tame and would allow us to approcah within eight feet.

The stone-grey iris of the eye, the faint tan markings on the sides of the breast and the white wing bars could be easily distinguished.

It has been seen since on several occasions, and in fact is nearly always to be found in its haunts in the ornamental shrubbery. Its main food supply seems to be the berries of the Boston Ivy which hang on the walls of the Administration Building in numerous clusters. While one stands within a few feet of it, the bird will fly to the wall, twist off a berry and return to its perch on a shrub to eat it.—G. H. DICKSON, W. E. HURLBURT, W. J. K. HARKNESS and FRANK STRANG.

MONTREAL, QUEBEC, December 27, 1931.—Localities visited: Mount Royal (769 feet), Ville LaSalle Woods (lowlands), Verdun and St. Lambert (woods, fields and river front), Victoria Bridge (7,000 feet length over St. Lawrence River) (some open water). 9 a.m. to 5.30 p.m. Weather clear and cold. 5 inches of snow on ground; walking good. Temperature 13° to 18° (1 p.m.); wind north-west all day, velocity 11 to 14 miles. Combined list of three parties, comprising six observers. About 28 miles covered by foot, territory between localities by automobile.

Scaup Duck (sp. ?), 5; American Golden-eye, 22; American Merganser, 44; Sharp-shinned Hawk, 1; Canada Ruffed Grouse, 6; Herring Gull, 6; Eastern Screech Owl, 1; Northern Flicker, 1 (apparently wintering in vicinity of McGill University grounds); Northern Hairy Woodpecker, 1; Northern Downy Woodpecker, 11; Eastern Crow, 5; Black-capped Chickadee, 79; White-breasted Nuthatch, 12; Brown Creeper, 5; Bohemian Waxwing, 70; Starling, 700; English Sparrow, estimated 400 (commonly associated with Starlings); Eastern Redwing, 1 (wintering with Starlings at St. Lambert); Canadian Pine Grosbeak, 7 (2 adult males); Eastern Snow Bunting, 65. Total: 20 species, 1442 individuals (including 1100 estimated as number of Starlings and English Sparrows).

Other species recently noted: December 20, 1931, American Hawk Owl, 1; Eastern Robin, 1; Eastern Golden-crowned Kinglet, 3. (Redpolls and Siskins entirely absent.).—L. MCI. TERRILL, V. C. WYNNE-EDWARDS, R. A. OUTHET, H. A. C. JACKSON, THOS. MCLAREN, NAPIER SMITH, *Members of the Province of Quebec Society for the Protection of Birds (Inc.).*

MONTEBELLO, QUEBEC, December 27, 1931.—Weather fine and clear, with a strong to moderate north breeze in morning, which fell somewhat during the afternoon. Temperature, 9.a.m., 11°; 1 p.m., 20°; 5 p.m., 10°. There was a light covering of snow with a crust, which made walking in the woods very noisy. Some of the fields were almost bare of snow. 12 miles by automobile, 12 on foot. No birds seen while travelling by automobile. Accompanied by Mr. H. D. Heaney in the morning, alone in the afternoon. A large variety of habitats, ranging from open fields and wooded hills to swamps and sheltererd valleys, was visited. The absence of Starlings from the list is believed to be due, not to oversight, but to their actual absence from this vicinity in winter.

Canada Ruffed Grouse, 6; Northern Pileated Woodpecker, 2; Eastern Hairy Woodpecker, 1; Northern Downy Woodpecker, 1; Canada Jay, 1; Northern Blue Jay, 2; Black-capped Chickadee, 5; White-breasted Nuthatch, 2; English Sparrow, 57; Canadian Pine Grosbeak, 6; Common Redpoll, 12. Total: 11 species, 95 individuals.—N. J. ATKINSON.

NOTES AND OBSERVATIONS

CLASPING-LEAVED CRESS OR PEPPERGRASS (*Lepidium perfoliatum* L.) IN CANADA.—An interesting addition to the adventitious flora of Canada, secured in the 1931 weed surveys of the Division of Botany, Dominion Experimental Farms, is the plant named above. It was first picked up, dry and lying loose on a shore, at Osoyoos, B.C. It was suspected of being a *Lepidium*, although quite unlike any others of my acquaintance; but as no growing plants were found in the neighbourhood, there was no means of knowing whether it was a wild or cultivated species. Three days later, on June 6, 1931, it was again met with at Cranbrook, B.C., growing in some numbers around an old fair ground, and along a stream nearby. It is evidently well established as a weed at this place, in hard, uncultivated ground. Both these localities are in the dry belts of British Columbia; Osoyoos, at the south end of the Okanagan Valley, close to the International boundary, and Cranbrook, about 75 miles east, in the Kootenay Valley.

Investigation later established the identity of the plant, and revealed only one North America reference to it. It appears in Rydberg's Flora of the Rocky Mountains and Adjacent Plains with the annotation, "Waste Places: Utah; nat. from Eu." Hegi's work on the European flora, was also found to attribute it to North America, perhaps following Rydberg's information. Indigenous to Lower Austria, it has spread to almost all parts of Europe and adjacent Asia.

Lepidium perfoliatum L. at once betrays its affinities by the dissected basal leaves, the shape and size of the pods, and the stiff upright habit of growth. The pale-yellow flowers, and the broad clasping upper leaves, are the most striking marks of distinction from our other species. These leaves are not, as the specific name would indicate, truly perfoliate, but surround the stem with clasping rounded lobes. The blades together with these auricles, form broad, ovate, pointed leaves, in sharp contrast with those on the lower part of the plant. So distinctive is the plant in appearance, it is inconceivable that it would be long in the country or at all widespread without attracting notice. It is probably likely to occur outside our dry belts.—H. GROH.

UNUSUAL NESTING SITES.—The interesting article in the September, 1930, issue of *The Canadian Field-Naturalist* on Unusual Nesting Sites, prompts me to add the following instances that have come to my notice.

On two occasions I have found Flickers nesting in cutbanks of this, the Frenchman River. This habit, if not of recent origin here, is certainly unusual, and less necessary that would be the case further down this river where trees of any kind are almost non-existent.

For several years in this valley there stood two old box-cars and two flat-cars on a railway "spur" leading into a disused ballast-pit. The box-cars were a favoured resort of several kinds of birds including Flickers which drilled holes in the sides, thereby making nest sites for themselves, and Mountain Bluebirds; a colony of Cliff Swallows took possession of the interior of one car, and a Say's Phoebe attached her nest to a bit of twisted wire hanging from the roof. A pair or two of Rock Wrens nested in the gravel-pit cliff and the flat-cars were a regular playground for the young birds. Fortunately neither House Wrens nor Sparrows ever visited the spot to disturb the harmony. When subsequently the track was torn up and the cars removed I was deprived of an interesting centre for bird-life study.

In the *Condor* (29: 249, 1927) I recorded finding the nest of a Magpie in a railway bridge. This is the only record to my knowledge of a Magpie choosing a site other than in a tree or bush. Crows generally build their own nests, but on one occasion I found where a pair had "remodelled" the top of a disused Magpie habitation. Both the Ferruginous Rough-leg and the Swainson Hawks are, I believe, their own architects also, but I have known a Rough-leg to occupy the nest of a Swainson built in the previous season. While motoring over the open prairie in 1917, I saw a Swainson Hawk's nest on the top of a "hay loader" standing close by the well-used road, and I am told the same species will nest on the cross-arms of telegraph posts alongside the railway track. I have found the nest of a House Wren in the side of an old Magpie nest, and that of a House Sparrow on a small ledge under the floor of a hay-rack standing idle in my yard. Another unusual place for a sparrow to nest was in a Russian poplar. When I last saw the nest and eggs they were lying wrecked on the ground, the result of a gale of wind.

Some 14 years ago while taking a Sunday afternoon stroll with a friend along the nearby railway track we walked right over a sitting Mallard, which the dog following us discovered and flushed. The eggs were within a foot of the ties, and concealed by weeds which during the war period flourished almost unchecked.—LAWRENCE B. POTTER.

KING EIDER TAKEN IN NOVA SCOTIA.—A juvenile King Eider was taken by the writer on November 15, 1929, in the Cornwallis River, near Wolfville. The bird was alone when taken, and no other Eiders were seen in the vicinity. Major Allan Brooks of Comox, B.C., identified the specimen.

The only other record of the King Eider for Nova Scotia of which I have any knowledge, was taken at St. Paul's Island, Victoria County, Cape Breton, and is now in the Provincial Museum at Halifax.—VICTOR E. GOULD.

ICELAND GULL ON LAKE ERIE.—On March 4, 1931, I had the pleasure of looking over the gulls and ducks at Sunnyside, at the west end of Toronto. There we found, along with many Herring and Ring-billed Gulls, at least six Blackbacks, which I have never met west of Toronto, and a single adult Glaucous Gull, of which species I had seen only one in previous years.

With this memory fresh in my head, three of us visited Port Stanley on March 22, and studied the Gulls carefully. There were about 50 on the breakwater which lay about a quarter or a third of a mile offshore, and as we studied them, more kept coming until there were three times as many. Soon after we began, one gull was selected because of his small size and whitish appearance, and while we watched, he changed position and flew a short distance, and twice he was on the rocks just beside a Herring Gull, which made a comparison of size very easy. He was distinctly smaller than the Herring Gull, had no black tips, and was very light coloured on the back, the colour apparently coming down only partway from the shoulders, just as described in Forbush's *Birds of Massachusetts* for the second year plumage of the Iceland

Gull. Moreover, the bill was conspicuously black at the outer end, perhaps for half-way. Nearby we found another light coloured bird which also lacked the black tips, but was larger, and must have been a Glaucous Gull.

These birds were carefully studied through a 33-power telescope, and the visibility was good.

What with a Franklin Gull last fall, a Kittiwake and a Jaeger about five years ago, Lake Erie is quite putting itself on the map for rare water birds; of course, the automobile and the telescope help a lot.—W. E. SAUNDERS.

ICELAND GULLS (*Larus leucopterus*) AT QUEBEC CITY.—Iceland Gulls have been present in small numbers, frequently, if not continuously, about the St. Lawrence River at Quebec City during the past two winters. Most of my observations of them were made from the window of my office near the water-front, though I have also watched them at very close range from the quay. Examination of my record of observations of this species reveals that in 1930 I observed Iceland Gulls on fifteen days in January, eleven days in February, and four days in March. The first of these observations was made on January 2nd, and the last observation in the spring was on March 28th. The largest number of Iceland Gulls seen in one day was 5, which number was seen on only two dates, January 28th and 29th. It was an ordinary thing to see 2 or 3 of the birds in one day, and solitary individuals were also noted frequently.

In 1931 I observed Iceland Gulls on twenty-one days in January and on seventeen days in February. The first of these observations was made on January 2nd and the last on February 28th. (January 2nd, being the first business day of the year, was the first day, in each of the years in question, when I visited my office, thus making an observation of this kind possible.) The largest number of Iceland Gulls seen in one day in 1931 was 14, which number was seen only on February 1st. On January 3rd and again on January 15th, 8 were seen, but more commonly from 3 to 5 birds were seen in a day.

Temperature and weather seem to make no difference in the occurrence of these birds in this vicinity. I have frequently observed them soaring calmly around in the fog rising from the river when it was about twenty degrees below zero, and during the worst easterly storms imaginable I have often seen them serenely riding out the gale with no apparent bother.

If there is calm weather, no matter how cold it is, they swim around, dipping their beaks in the water and drinking, exactly as if it were a warm day in summer.

There are no wintering Mergansers or other Ducks here, so these Gulls cannot live by robbing such fishers, as I am informed they do elsewhere. I think that their food here consists largely of sewage, as well as of refuse drawn from the ferry boats or dumped into the river with the snow from the streets.—R. MEREDITH.

BOOK REVIEWS

CANADIAN WRITER'S MARKET SURVEY. *Compiled and issued by The Writers Club, Toronto. Ottawa: Graphic Publishers Ltd., 1931. 318 pp. $2.00.*

Those of our readers who make an occasional dollar by their pens will be interested in the appearance of this volume which is undoubtedly the most complete survey of Canadian markets for the free-lance writer in existence. Lists of other markets in the States, England and the British Empire are also given as well as lists of book publishers, verse markets, syndicates and also hints on the preparation of manuscript, copyright, the radio and moving pictures. Unfortunately, the volume has many faults; most obvious among them, the uneven character of the information given. Thus we are told that *Canadian Magazine* pays about a cent a word on acceptance, the *Western Home Monthly* pays on publication but the rate is not given, and in the case of the *Dalhousie Review* nothing more than the address is given, not even the editor's name. More careful editing could surely have eliminated a number of such faults, but even as it is the book is well-worth adding to the free-lance writer's library.—D.L.

DICTIONARY OF GREEK AND LATIN COMBINING FORMS USED IN ZOOLOGICAL NAMES. *By Edmund C. Jaeger. Charles C. Thomas, Springfield, Ill. 1931. $1.50.*

Here are listed some 2000 of the numerous Greek and Latin forms which are used in the naming of zoological species. It is obvious that the list must be incomplete but a careful check-up of a number of generic and specific terms taken at random showed surprisingly few omissions and none of importance. Such a list as this should do much to put both amateurs and students at their ease and to rob these often formidable names of their terrors.—D.L.

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ANNUAL CONVENTION OF WINTER GEESE

By R. W. TUFTS

NOT EVERY town in Nova Scotia is so fortunate as to be within the boundaries of the line of flight of the wild geese when they pass over the Province in the Autumn on their way south. The limits of their route are not definite and no doubt vary somewhat depending upon prevailing winds and other weather conditions but the usual belt is approximately that area between Windsor and Annapolis.

Every year since I can remember, the wild geese have flown over Wolfville in the autumn always heading southwest in long wavering lines or in perfect "V" formation. Their weird and musical honking could be heard when they were yet far off and they were always a cause for wonderment to all who saw them passing with slow wing-beat yet moving onward with amazing swiftness till all too soon they would be lost to view. Many a group of youthful hockeyists on the Grand Pré meadows during the first freeze-up in December momentarily lost interest in the coveted puck to gaze skyward as the wavy lines passed majestically overhead.

That the appreciation of the beauty and mystery of these strange annual occurrences is not confined to any individual or to any particular race is forcibly brought to mind by the following poem which has been translated from the Chinese:

"How oft against the sunset sky or moon
I watched that moving zigzag of spread wings
In unforgotten Autumns gone too soon,
In unforgotten Springs!

"Creatures of desolation, far they fly
Above all lands bound by the curling foam;
In misty fens, wild moors and trackless sky
These wild things have their home.

"They know the tundra of Siberian coasts.
And tropic marshes by the Indian seas;
They know the clouds and night and starry hosts
From Crux to Pleiades.

"Dark flying rune against the western glow—
It tells the sweep and loneliness of things,
Symbol of Autumns vanished long ago.
Symbol of coming Springs!"

It was not till within the last decade that I discovered that the haven for which these flocks were heading was actually within the confines of our own Province though at that time only a relatively small percentage of the people of Nova Scotia were aware of this. In the secluded harbours of Port Joli and Port le Herbert in Shelburne and Queens Counties thousands of wild geese spend the winter. Here where the shoal water prevents shipping activities, the birds find shelter and food to their liking in the eel grass which thickly covers the beds of the harbours and which even at high tide in some sections is near enough to the surface to be accessible. But when the temperature falls to zero and below, the ice which begins to form along the shore when the tide is in, rapidly extends outward and when the tide drops, leaves a deposit of shale ice, thus encroaching sometimes to a serious degree on the feeding grounds. At such times the birds are much concentrated and the competition for food is very keen. These severe cold snaps are usually of short duration however and when they moderate the ice is soon lifted and the food exposed.

These two harbours are separated by a long headland which makes out to sea and rather than fly round it the birds take a direct overland route, a distance of some six or seven miles. About fifteen years ago these harbours were declared a Provincial Bird Sanctuary and are still set aside as such. We are frequently asked, and most pertinently, how it is that the gunners are allowed to shoot the geese when it is a Sanctuary. The explanation is this: The feeding grounds are a sanctuary but the law provides that shooting from the shore may take place during the open season. When the roll is called in the spring and it is time to go north again, there are many gaps caused by the absence of those birds which ventured too close in the open season to the woods which surround the harbours and which provide ambush for the watchful gunners.

The main shooting however is done as the birds fly from one harbour to the other over what is known as the Goose Hills on which are located a number of hunters' cabins. Sometimes days go by with no "flight" over the Hills and time drags

heavily for those in camp who do not enjoy a friendly game of bridge or poker but when the honking of a passing flock is heard, there is a great hustle and scramble for foot gear, guns and ammunition and the favoured stands are quickly occupied in the hope that those which have passed over are but the vanguard of many others which may be seized with a similar urge to try new pastures and their hopes are generally realized, for when one flock flies across, others usually follow.

There seems to be no satisfactory or generally accepted explanation for these highly irregular flights though a number of theories are advanced by the Port Moutoners and Port Jolliers—not all of whom reside at Port Joli. Sometimes the geese fly so high that few if any are brought down, but at other times, particularly when it is very stormy or very windy, they fly lower, and the result can be imagined, for often there are fifty or more gunners in hiding behind granite boulders and dead trees, many of the latter having fallen since this area was burned over a few years ago. Many of these favoured stands are close together and great are the controversies and heated are the arguments as to who brought down each particular bird. "Ai killed thawt goo-ze" says the brawny Port Moutoner, "Ai watched thawt goo-ze leave the 'arbour." These disputes however are settled more or less amicably by resorting to the time-worn custom of tossing a coin or later at the card table.

Local opinions as to the numbers of geese which comprise this winter colony vary greatly, estimates ranging from 50,000 to "millions" but to exaggerate at such times is a well-known human frailty and a more conservative estimate and one which was arrived at after carefully studying the flock with high-powered binoculars places the numbers at approximately 50,000.

When the entire congregation of geese is in Port Joli Harbour, and this is often the case, the chorus of their confused and clamorous voices on still nights can be heard for a great distance. Years ago the resonant chorus from this earliest of aviation fields so disturbed the pioneer fathers that they were wont to resort to the throwing of flares to frighten the geese from the shores near their cabins.

There are on exhibition at the Post Office at Port Joli a number of Indian stone arrow-heads which have been found in the estuaries of some of the small brooks which run into the harbour. It is believed that before the invasion of the white man these were used by the Indians as they sat in ambush for the geese which even in that far-off day, as now, ventured into these danger zones for fresh water and gravel. Now they come chiefly under cover of darkness, for the deadly Winchesters and Remingtons of to-day offer scant quarter as compared with the hand-chipped flint of the Micmac brave.

As one sits on the bank watching the grey and white army consuming its rations of eel grass, a sinister shadow from the far heights falls across the snow. This is made by the Northern Bald Eagle, rare indeed over most of Nova Scotia but never absent from the Port Joli region while the geese remain. Every winter a dozen or more of these great vulture-like creatures with a wing spread of seven or eight feet haunt the woods which encircle these harbours to prey on the wounded geese. They too are nature's remorseless time keepers who bestow a swift and pitiless end to any aged or decrepit member of the colony. The old biblical statement "For wheresoever the carcass is, there will the eagles be gathered together" applies here.

But the eagles are not the worst enemies of the geese. It is the gunner that they fear most, and were it not for the Migratory Bird Officers who are stationed there throughout the season the birds would probably be driven out completely in a few years. Many shots are fired at birds passing high overhead out of reasonable range. The birds are often hit and it is pitifully easy to trace the course of a flock that has recently been fired at, by blood drops on the snow from birds which are bleeding as they go, and which, in many cases, are so weakened thereby that they fall easy victims hours or maybe days later to the eagles of which I have spoken.

About the middle of March there is a stir in the flock,—their very call seems to change. Some knowledge that is older than human knowledge, some need that is as deep as nature is awakening once more within them. Some morning when the pussy willows are showing their first touch of silver, and drizzling rain has succeeded the frosty nip of winter winds, a small flock, perhaps a hundred or less, detaches itself from the main army. They rise in ragged formation from the water and circle many times over the harbour calling most excitedly as though they were trying to induce others to join them. Those below are also making a great clamour as if trying to persuade those in the air that the time has not yet arrived for departing. Finally the flock swings off, usually in a northeasterly direction and almost invariably a few weak-minded stragglers turn back to rejoin the main flock. Hour after hour this pageant of leave-taking continues until at the end of about two weeks practically all have departed on the long flight north.

We do not need to borrow from the Chinese

poets our most beautiful picture of this spring migration, for Charles G. D. Roberts, the Dean of Canadian Literature, has given us a perfect portrait in an exquisite sonnet which so admirably sets forth the charm and mystery of this departure.

"High through the drenched and hollow night their wings
Beat northward hard on Winter's trail. The sound
Of their confused and solemn voices borne
Athwart the dark to their long Arctic morn,
Come with a sanction and an awe profound,
A boding of unknown, foreshadowed things."

SUB-ARCTIC MUSHROOMS

By H. S. SPENCE [1]

The locality is the southeast corner of Great Bear Lake, N.W.T., longitude 118°, latitude 66°, being only a few miles south of the arctic circle. The observations were made from the 10th to the 25th of August, 1931.

The ground there consists of bare, low, rocky points and islands. Depressions are filled with small boulders and/or moss and lichen. There is practically no soil, unless a very little sand here and there can be called soil, and all the sparse phanerogamic vegetation grows in moss.

I was surprised to find such an abundance of fungi in what seemed such unlikely situations. Even small, shallow, moss-filled depressions on islands and promontories supporting no tree or shrubby growth often had mushrooms in them. Usually the fungi were more abundant around the higher and dryer margins of the basins than on the lower and moister portions. As there is practically no drainage into such places the moss must act like a sponge and retain the moisture from rain almost indefinitely. At any rate the dryer the ground the better the mushrooms seemed to grow, and as I have said they grow, not in soil, but right out of the thick moss which is often 20 to 30 inches deep.

At the date named most of the varieties were just passing their prime and there were probably more old specimens than young ones to be seen. The summer had been fairly dry and cool. The ground in this region remains permanently frozen at a depth of about 36 inches but I suppose the moss thaws out quite completely.

I did not notice that the fungi showed any preference for wooded areas more than for bare moss varied in some places with a few small shrubs. The only tree growth is a sparse one of small arctic spruce with here and there an odd white poplar or birch. The shrubs are mostly alder and willow. The fact that mushrooms grow in abundance and luxuriance where it is daylight until 11 p.m. in August, and where it is practically never quite dark during the growth season offers a problem for those who as I remember used to claim that mushrooms grow only in the dark.

I found the following species extremely abundant: *Lactarius deliciosus*, *Lactarius torminosus* or near it, *Russula emetica* and *Cortinarius armillatus*. Less abundant but still common were: *Lactarius hysginus*, *Cortinarius cinnamomeus*, *Cortinarius violaceus*, *Boletus*, a species of a uniform gray colour having a very thick cap, *Hydnum repandum* up to 6 inches across and a species of *Calvatia*.

Incidentally I succeeded in interesting the men at the camp in mushrooms for the table. Previous to my visit they had never even noticed their existence and were quite surprised when I started bringing them in. I induced the cook to prepare a quantity for one midday meal of which some of the men rather diffidently partook the others telling them they would be dead by four o'clock. However as no casualties occurred the hesitaters took courage and having once tasted there were henceforth no refusals of mushrooms at the table.

The cook knew something about cooking them too, for he added a little onion, wishing at the same time that he had some celery to put with it. I was agreeably surprised to find that the onion really improves the flavour of the dish.

[1] Learning from Mr. W. S. Odell of my interest in our fleshy fungi, Mr. Hugh S. Spence, connected with the Dominion Department of Mines, on the occasion of sending me some unidentified material, accompanied it with an interesting account of observations he made last summer upon the prevalence and uses of the Agarics and some other fleshy species which he found growing in the northern tundra. Good botanists and expert collectors have been attached to several expeditions to Arctic America but they have been specially interested in the green plant life. The fact that Mr. Spence was interested more particularly in the edible fungi makes his observations a worth while contribution to the knowledge of our arctic flora. I think they deserve permanent record and with his permission to publish them I am offering them to *The Canadian Field-Naturalist* whose readers I am sure will be pleased to see them. London, Ont.—JOHN DEARNESS.

It was decided by the men that *Lactarius hysginus* was the best of the lot with *L. deliciosus* a good second. Several writers allege that the last named species does not merit its name, but we found it very good. We used it, however, only in the button and semi-expanded stages. By the time it reaches the funnel shape it becomes tough and loses its flavour.

NOTE.—Mr. Frits Johansen found *Calvatia cretacea* Berk. on stony tundra at Bernard Harbor in 1915. This is the only one of the larger species of puff-ball reported from the Canadian Arctic; it may be the one that Mr. Spence collected and doubtless like the other large puff-balls is wholesome food. Few people here venture to cook *Lactarius hysginus* Fr. on account of its fiery taste when raw.—J. D.

THE MAYFLIES OF LAKE WINNIPEG

By FERRIS NEAVE
University of Manitoba

THE FOLLOWING list of species will doubtless seem very short when one takes into account the enormous size of Lake Winnipeg and considers, moreover, that it lies on the boundary between very different types of country. Undoubtedly the list is incomplete, but natural factors contribute to its brevity. In the first place no attempt is made to include the numerous forms which inhabit the streams, rivers and lagoons of the area, but only those species whose nymphs live in the main body of the lake. Since most mayfly nymphs are confined to quite shallow water, it is obvious that in a body like Lake Winnipeg such species can only exist along the shore line. Owing to the size of the lake and the prevalence of unsettled weather most of the shores are exposed to a great deal of wave action, which further restricts the fauna to forms which can withstand these conditions. Again, a general lack of aquatic vegetation accounts for the absence or scarcity of many other species. With regard to the nymphs, it is well known that the three subfamilies *Ephemerinæ, Heptageniinæ* and *Bætinæ* may be described roughly as burrowers, stone-clingers and swimmers respectively. In the present list it will be noted that the species are about equally distributed between these three groups. Actually, however, the species of *Bætinæ* are much scarcer and more local than the members of the other two subfamilies, due to their relative inability to withstand the above-mentioned conditions. They are found only in comparatively sheltered situations. On the other hand, nearly all the other species are abundant and widely distributed over Lake Winnipeg, being well adapted to the prevailing types of habitat. With the exception of the two species of *Centroptilum*, whose distributional status is uncertain, the list consists of species with a wide geographical range. In most cases this range, as known at the present time, lies mainly to the east and south of the area under discussion. A very similar list could probably be made for a great many of the larger lakes of North America.

EPHEMERINÆ

Ephemera simulans Walk.—Very common as far as the extreme north end of the lake. The nymphs affect particularly shallow, sandy bays. They have been found in the stomachs of sturgeon from Lake Winnipeg. The flying season lasts from June to August.

Hexagenia limbata occulta Walk.—This species and the next are the so-called "fish flies", which appear in tremendous numbers in July. The nymphs burrow in the mud and are more thoroughly adapted to a lacustrine life than any other species in Lake Winnipeg, living often at distances of several miles from the shore and occurring at depths down to 50 or 60 feet. They form an important food supply for whitefish, sturgeon, goldeye, perch and other commercial fishes.

Hexagenia rigida McDunnough—Abundant but considerably less numerous than the previous species.

Ephoron album Say—Plentiful in late summer in many localities.

BÆTINÆ

Blasturus cupidus Say—Ponemah and mouth of Manigotagan River. Nymphal skins of this or the next species at Warren's Landing and George Island. The nymphs have the habit of migrating considerable distances up small streams in early spring.

Blasturus nebulosus Walk.—Wells Harbour, 14-15 July, 1930 (F.N.)

Cænis forcipata McD.—Common in various localities in both northern and southern portions of the lake, June to end of August.

Bætis spp.—Single specimens of adults and nymphs have been taken but not in sufficient numbers to determine the species with confidence.

Centroptilum infrequens McDunnough—Winnipeg Beach (A. T. Hunter) Holotype. (*Can. Ent.*, 56:98). It is doubtful if this is really a lake shore form, as considerable collecting in such

habitats has failed to rediscover it.

Centroptilum quaesitum McDunnough (?)—Inhabits protected, shallow bays with a growth of aquatic vegetation. At present known only from the northern portion of the lake (Warren's Landing and Gull Bay, near Long Point).

HEPTAGENIINÆ

Siphloplecton basalis Walk.—Taken only on the Manigotagan River, near its mouth, but probably occurs also on the lake itself.

Heptagenia hebe McDunnough—Husavick, 29 Aug. 1923 (J. B. Wallis); Gimli, 23-24 Aug. 1930 (F.N.).

Heptagenia pulla Clemens—A very characteristic form, occurring in all parts of the lake. The nymphs are common along stony beaches. Adults June to August.

Ecdyonurus tripunctatus Banks—Plentiful, June to beginning of August. Nymphs on stony shores.

Ecdyonurus interpunctatus Say—Abundant all over the lake. Shows great variation in colour, some specimens being perhaps dark enough to be considered as *canadensis* Walk. Nymphs often found in company with those of *Heptagenia pulla*.

Ecdyonurus terminatus Walsh—Not common but widely distributed. George Island; Grindstone Point; Gimli. June to August.

WHITE STRAWBERRIES

By SUSAN K. SQUIRES

IN A BOOK which I read recently the author made the characters pick white strawberries on an island in a lake somewhere in northern Alberta or British Columbia. I wondered if these strawberry plants are indigenous to Canada or if the author were just drawing on his imagination. I have been quite interested in their history for a number of years—because I have grown them.

We moved to our present home in May, 1898, and that autumn the daughter of our predecessor asked me if I had seen any white strawberries that summer. I told her that I did not even know that strawberries ever were white. She took me out into the orchard and showed me the spot where they had formerly grown and said that they had grown there when her father had bought the place twelve years before. As the spot was covvered with heavy timothy hay I did not think that there was much chance for strawberries. However, I kept watching for them for several years and at last concluded that, if they ever had been on the place, they had died out; and not for twenty years did I find them.

About ten years ago someone said one afternoon that wild strawberries were very plentiful in a back field, and I proposed that we go and pick some as they are so delicious. We passed through a small hardwood grove and as I stepped down from an old stone fence behind it I saw a patch of strawberry leaves, not the vivid green they should be, but with a peculiar yellowish tinge to them. I stooped and brushed back the leaves and saw quite a number of creamy-white berries. I picked and ate the largest and it was sweet. Like a flash my memory bridged the years and I said, "White strawberries." They were growing not four feet from the fence and directly under the far out-reaching branches of a big yellow birch and were somewhat stunted from lack of sunshine. I called to my sons who were with me and showed them what I had found and one of them exclaimed, "Why, I saw leaves just like those on the other side of the grove." We retraced out steps and found the spot not far out from the trees and perhaps ten or twelve feet in diameter with sturdy plants scattered all through the grass and most of the plants bore fruit.

Although it was the middle of July, I transplanted thirty plants to a vacant row in the garden and not one of them died. When I moved them to a permanent position in October, some of them had as many as thirteen suckers with new plants on the tips. In two or three years I had quite a bed, but by that time the robins learned that strawberries did not have to be red to be edible. The fruit was seldom much larger than a marble and it lacked the sharp acid of the red berries. Although the white berries had rather a pleasing flavour, they were sometimes insipid. In picking them a convenient peculiarity was the fact that they stemmed themselves, the calyx always staying on the stem. The fact that one was quite likely to pick immature fruit was not so convenient.

One structural difference between the white plants and any other strawberry plants I have ever seen was in the fruit stems. They grew like the blossom stems of the house primula. The fruit stem grew out from the plant and produced one set of berries, then a bud in the centre developed into another stem and cluster of berries, to be again extended into a third cluster of fruit. This was the rule rather than the exception on sturdy plants and much prolonged the bearing season. If this peculiarity could be

transferred to commercial plants it might perhaps be of some economic value. The plants had a large number of fruit stems and bore well, but to my mind the berries were not as pleasing to either the eye or palate as red ones. When cooked they were about the colour of apple-sauce and did not look appetizing without the addition of red berries.

After we once began hunting for the plants we found them growing in as many as ten widely separated places in an area of perhaps ten acres. Only two of the spots were in what had been the old fenced-in orchard or garden. Most of the patches were close to fences where trees were growing and where the birds could have dropped the seeds. Only two spots were in the open meadow and these could easily have been started by plants carried on plough or harrow. We found fruit on nearly all of the plants for two seasons and then they seemed to retire into obscurity again. Since we are now familiar with the foliage we can find it by hunting, but no fruit. Why the plants grew the way they did those two summers could only be from climatic conditions for other conditions were exactly the same the following years.

Where the plants came from originally is, of course, one of the facts that has been lost in the years. I know they have been growing here for forty-five years. If they are not native they were probably brought here from England. Back beyond sixty years ago the place was owned for a decade or two by a succession of officers of the old British regiments which were stationed in Fredericton during those years. Or perhaps they date still further back to when the owner was an old Loyalist judge whose forbears were English. For twenty-five years he had an English gardener and fine gardens until he unfortunately fought a duel, killed his man, and had to flee the country.

I have heard of the white strawberry plants growing in another garden in the city, pushed out under the fence and neglected but still existing. This garden was also on a place owned by the early English official class, at one time, I believe, by one of the earlier governors.

A lady caller told me not long ago about these berries growing in her cousin's garden at St. Andrews-by-the-Sea. His grandfather had brought the original plants from England.

They are probably growing in other places in the Maritime Provinces. In an article in a recent magazine, a Wolfville, Nova Scotia, lady tells of having a few plants given her from an old Dutch garden in East Chester, Nova Scotia, where they had been growing undisturbed for fifty years.

It seems remarkable that the plants should survive so many years without any care. I suppose it is no more strange, however, that white plants should live than that wild red plants should, one seems about as hardy as the other.

CONTRIBUTIONS TO THE KNOWLEDGE OF EXTREME NORTH-EASTERN LABRADOR

By BERNHARD HANTZSCH

TRANSLATED BY M. B. A. ANDERSON

"Beiträge zur Kenntnis des nordöstlichsten Labradors," von Bernhard Hantzsch, *Mitteilungen des Vereins für Erdkunde zu Dresden.* Dresden, Volume 8, 1909, pp. 158-229. Volume 9, 1909, pp. 245-320.

(Translated from the original German text in the Library of Congress, Washington, D.C., by M. B. A. Anderson, M.A., Ottawa, 1928.)

Original pagination given in the text.

(Continued from page 36)

My most important experiences concerning the native population may now follow. These, as all the other Eskimos, are slowly approaching destruction, at least as far as their pure racial representatives are concerned. If even the Labrador missionaries write, that their work for the natives is "like the last service of love for a dying person," then the size of the population is steadily decreasing. The race may represent an old branch of the human species, which is now outliving its time and is pining away. The 80 to 100 Eskimos, who are regarded as residents of Killinek, form no independent line. They call themselves as do all other Eskimos merely "people" [Menschen] (Sing., innuk; Dual, innuk; Plur., innuit), by which term they distinguish themselves from the white people (Kablunak, -naek, -nat). The name cited by Franz Boas for the inhabitants of Cape Chidley Kedlingmiut (according to the Labrador custom written perhaps as Killingmiut = those who live farthest toward the sea, that is, farthest north, right in Killinek—this latter word again superlative (-nek) from Killek = far to the end out towards the sea) and the term Koguangmiut are perhaps understood, but not used as true terms for a line. Koguangmiut (better perhaps Koksoangmiut = who live on the Koksoak, the "great river" in the south of Ungava Bay) for the people of Ungava

Bay (compare A. P. Low, *Cruise of the Neptune*, 1906, p. 134), according to other accounts (*The Newfoundland and Labrador Pilot*, London, 1897) perhaps for the inhabitants between Cape Chidley and the Koksoak the name Kungavamiut (according to Labrador custom better Ungavamiut = inhabitants of Ungava Bay; ungava = a territory where someone lives again, separated by land lying between). Formerly the different families were more attached to definite dwelling places than now, were named after these places, and claimed hunting and fishing rights there for themselves. These families have for a long time mingled and through association with the whites are losing still more their special local peculiarities. Among the adults of the families at the station in 1906 there were more female than male individuals, though in the Winter previous to this three robust married men had died of illness; the number of children could be noted as favourable. That of the old people on the other hand less favourable. Besides a few women there was only one old man. The majority of the inhabitants were heathen but a small number in the south of Ungava Bay had been baptized by a white man not a resident of this place, and without sufficient religious instruction. In their outward appearance the Killinek Eskimos show the type peculiar to their race quite unadulterated. Whenever a few people, especially a girl of rather large size, are to be distinguished by relatively light colour of skin and European cast of features, the conclusion is, that in such cases mixture of blood with the whites caused the change. The majority of the people from the south of Ungava Bay were characterized by a taller and more slender form than the old settled Killinekers, perhaps only by chance. I judged their height to be 175 centimeters. One woman in particular had in addition such a strong Indian cast of features that I was convinced that here there must be older or later relationship with this race, which is not outnumbered by the Eskimos in the south of Ungava Bay. The Killinekers, who at first glance may be claimed as pure racial types—my companion Paksau was such an one—are distinguished by short, compact stature (men about 155-165 centimeters, women about 145-155 centimeters) broad shoulders, slightly marked waists even in the case of the women, and rather small pelvic hipbones in the case of the latter whereby the back appears more evenly longish. Further they possess strong muscular arms and occasionally rather short, but not crooked, legs. With advancing age, especially with the women, real obesity occasionally occurs from lack of exercise. The feet and hands are small and well-proportioned. The face is broad, often round and full, at other times more square on account of the strongly developed, projecting cheek-bones and lower jaw, the forehead normal and mostly slightly arched [P. 259] the cheeks are full and thick. Between the cheeks the broad-nostrilled nose, which is very flat at the root, rises only a little way. Indeed in small children the nose is often imbedded between the cheeks and rises up above these only with the tip. A flattened nasal structure, characteristic for Eskimo children, might have its reason at least in part of the stay of the offspring for months, even for years in the mother's hood. Usually I found the children sleeping there with legs drawn up, so that they leaned the fore side of the face on the back of the mother, as this corresponds to the natural position of the new-born child, bending forward. I could see no example in this district of intentional deformation of the skull, as Francis C. Hall reports of the Eskimo races, living farther north (*Life with the Esquimaux*, London, 1865, p. 520) by means of lateral pressure and covering with a tight-fitting leather cap. The most good-natured-looking eyes have an iris of black-brown colour, rather thick lids, which draw close together, and often a somewhat oblique shape, which seems truly Mongolian. The mouth is broad and not rarely thick-lipped. The people frequently let their mouths stay open, especially in attentive observation of any kind of event. The teeth are usually regular, strong and firm, but at the present time do not appear to have the durability of previous generations on account of the different food, especially the use of sugar, bread and perhaps tobacco. At least dental troubles and along with them tooth-ache, decayed teeth and in older people great loss of teeth are nothing rare, even if according to my observation less frequent than in the more southern Eskimo who have been civilized a longer time. The colour of the enamel is yellowish. Farther in the south they chew resin, and so whiten the teeth. Not rarely they use the teeth for holding something firmly or for other sorts of work. The ears are well-shaped and comparatively small. They are usually covered by the coarse, shining black hair, which hangs down quite smooth and very thick. Women and girls braid two or more braids, which they tie together at the ends often, or [P. 260] perhaps tie up to the back of the head, and adorn with ribbons in the Moravian colours, if they possess any. Men and boys cut the hair at the nape of the neck usually, a custom which deserves preference in opposition to the short-cut frequently used at the Christian stations of Labrador, not only on account of the appearance, but also for

practical reasons. The hair falling smooth and orderly even without daily combing forms the natural protection against the sun's rays, wind and cold, as well as the best cushion under the head when asleep. The occurrence of head-lice may be considered the only reason for a short cut, but these only appear on people who are not at all clean, and with such people are not to be removed anyway.

The eyebrows as a rule are not well developed; in many people, especially children, they are almost lacking. The hirsuteness of the rest of the body is on the whole slight. Only in the case of older men a very thick beard develops at times, but it rarely covers the outline of the face. The shining black colour of the hair is not lost until old age. Persons with white hair are said to occur rarely, and then to be at least 80 to 100 years old. I have seen nothing of bald-headed Eskimos even at the Christian stations, where the population has degenerated. Now and then the hair was thin, especially with old women. The men often appeared considerably younger than they really were, because of slight growth of beard. The age of the maidens and women could be estimated more easily. When both sexes have passed maturity, they age compratively early. But I did not get the impression that this happened with the women noticeably sooner than with the men.

Some of the older women in Killinek showed slight tattoo marks on their faces, that is, six to eight lines on the chin running from below the chin upward to the mouth, as well as some streaks on forehead and temples. The blue-black colour of this simple decoration is said to be brought about by drawing under the skin a thread blackened with lamp-black. [P. 261] In older times this decoration was applied following marriage but at the present time is no longer used. The colour of the skin of these Eskimos is in general a dull bronze to yellow brown, mostly so uniform and dark, that a normal reddening on the cheek is no longer to be distinguished, perhaps though a sudden blush of deep emotion. As for the rest the intensity of the colour is said to change with the seasons of the year; the bright sunlight of the spring colours face and hands especially dark, at times to a dark brown. This tone bleaches to a gray yellow brown up to winter and loses through lack of cleanliness still more freshness and vivacity.

The physical strength of both sexes is considerable, even if it may not be so great as that of educated white workmen. Our Eskimos might compare favourably with such people in respect to toughness and endurance, even outdo the white workmen in case of continuous under-feeding. On rather long marches, in which generally a rather quick pace was kept, I was continually surprised how my companions, even the strong Paksau, tired so much that at every opportunity they sat down, while I myself felt no great desire for rest. Just how far laziness and weak will were concerned I was not always able to judge. An Eskimo is seldom graceful, skillful and dexterous. The short, stunted form does not permit much to be expected in this respect; the serpentine agility of the Indian is entirely lacking. Therefore the Eskimo hunter prefers to sit with endless patience on the watch, rather than venture a quick stalking. To be sure his thick clothing hinders him in the full use of his limbs and this is still further lessened by the numbing cold. Even women and girls as a rule possess little grace of movement. Of the senses the sight is developed the most. This fact apparently has as a reason only the normal use and frequent exercise of the eyes. Old people, as with us, often become farsighted, and then can no longer aim well with a gun. At the more southern mission stations some people [P. 262] wear glasses. The hearing is, likewise, well developed; the other senses less.

These Eskimos are in no way spared from illnesses so much as is expected from a primitive people. Their whole manner of living, which, of course, is influenced by the inhospitable character of the land must be designated in a hygienic respect. Life in the raw air, in draughty tents, in the damp earth or snow-house, sitting and lying on cold, damp ground, getting wet in downpours, etc., favours contracting colds. Catarrhal colds are frequent; the handkerchief plays a certain role already with the better-mannered Eskimos. Coughing seems to occur somewhat more rarely, though whooping-cough demands its toll at times. According to information from the missionaries tuberculosis is said to occur not infrequently, and then usually leads to death quickly. It is spread through the restricted life together in poorly ventilated, dirty rooms, the use of the same dishes, much tobacco smoking, partly with the same pipes used by several, and as a consequence the objectionable habit of frequent spitting. It is known that tuberculosis also attacks most Eskimos who stay for some years in temperate climates, for example in Europe. Stomach illnesses occur frequently, which are induced by irregular manner of eating but are usually of rather light nature. The medicines dispensed mostly by the missionaries consist therefore of the old dependable home remedies for the digestion. Unsuitable food in combination with lack of cleanliness produces perhaps that cachectic disorder, which expresses

itself in skin disorders, especially ulcers and a rash. How far scrofula is to be assumed as a cause of the latter ailments, cannot be so easily decided. The wide-spread and infectious *kallak* occurs especially in the Winter. It is worthy of note that this disease does not occur in nearby Baffin Island at all, as Captain James S. Mutch in Peterhead (Scotland) assured me, who had a wide-spread knowledge of that district. It is likewise emphasized [P. 263] by Peary, Senn and others of the Etah Eskimos in northwest Greenland, that they are free from conspicuous skin diseases. In the Labrador population often a large part of the community suffers weeks, even months from this virulent, itching malady, which begins in the face and spreads over almost the whole body in severe casse, so that the sufferer can sit or lie only with pain. The disease does not seem to be so bad as in the south. A remedy, which will heal quickly, is not known, according to the statements made to me by the mission physician in Okak, Dr. Hutton. In general they are helped by certain salves, which, therefore, must be on hand in considerable amounts as a further home remedy of the mission stations. The Eskimos are usually like children: they neglect the regular application and washing, scratch off the scabs and prolong the healing process. If the salve fails to heal, then they try to influence the *kallak* favourably by eating seal blubber, occasionally also by rubbing with this. Abundant eating of berries in the autumn is said to repress the outbreak. Perhaps favourable healing results are attained through the use of the native herb tea in place of the inferior Chinese tea. Fortunately the *kallak* heals up in such a way, that it leaves behind no scars

Tape-worms and other parasitic forms occur not rarely among our Eskimos. The missionary, S. J. Townley, who was experienced in a medical way, had heard different Eskimo proverbs and sayings, which ridicule the appearance of intestinal worms.

Here it can be stated that the cosmopolitan head louse (*Pediculus capitis* Deg.), mentioned earlier, is apparently the only parasite which afflicts the Eskimos externally, and also is not to be permanently removed easily from their heads and houses. That the mothers hunt up the lice on the heads of the children and then according to the good old Eskimo proverb, "Whatever bites must be bitten in its turn," stick them in their mouths, I have repeatedly seen myself in Killinek. Whether *Phthirius pubis* L. [P. 264] occurs, I could not find out, but consider it improbable on account of the slight growth of body hair. Whenever the people speak of different lice, it may perhaps refer only to the different sexes and ages of *Pediculus capitis*. I could collect this species only in countless specimens.[31]

The Eskimos suffer naturally from all possible inner diseases besides breathing and digestive disturbances, which seem similar to our European diseases. Such varied conditions as the tropics produce, the north does not know at all. Only let there be mentioned for this district the not rare occurrence of heart trouble; which is made worse by strenuous physical exertion, over-indulgence in strong tobacco, and in many cases perhaps in too frequent sexual intercourse. A further illness, according to Dr. Hutton not yet explained, is a kind of influenza, which at times attacks strong individuals. Within a few days the one affected becomes noticeably weaker, the activity of the heart declines, and temporarily stops; occasionally the lungs seem to be affected, there is a slight fever, as a rule, and in most cases death occurs without any clearly recognizable cause. Here it may be stated distinctly, that the physical body of the Eskimo, whenever he becomes very ill, is shown to be much less capable of resistance than that of the white person thoroughly immunized through many illnesses. Unfortunately in the Okak hospital no kind of post mortem examinations have been made of the dead, who died under the circumstances described, which might have resulted in the discovery of the cause of this peculiar illness. Dangerous infectious diseases occur occasionally to a very large extent, and are known frequently to be brought in from the outside. Several times measles, typhoid, and apparently also diphtheria have taken a heavy toll of human life. Some particularly terrible epidemics are described in the publications of the Moravian brotherhood from the older mission stations.

[P. 265] Neither has this good-humoured and light-minded population escaped syphilis, even some of the Killinek people living away from communication with the oustide are said to be infected. The consequences of such ailments may be more apparent with these formerly uninfected children of nature than in the case of civilized people.

Outer wounds seem to heal quickly and for the most part well. They are left to nature herself or at the best are bound with the skin of animals, fresh or moistened, in the absence of any European material; the wounds are covered with juicy herbs, especially Sedum, or an attempt is made to influence their healing favourably by sorcery. In sudden accidents they are usually

[31] Kindly identified by Dr. B. Wandolleck at the Zoological Museum in Dresden.

confused and helpless, since they do not know even the simplest principles of first aid. For example, in 1906, three men fell into the water. No Eskimo can swim, because it is hard to practice this form of exercise in the cold water. One of the people rescued himself on a stone and was brought to land half frozen, another vanished in the water, a third was pulled out of the water still warm. But since no one, not even the Europeans present, knew anything about artificial respiration, they let the man die. They put splints on broken bones without any special training. A female skeleton collected by me showed a broken arm, healed up very favourably. They rub frost bites with snow. Amputation of a limb because it has been frozen, seems to be necessary only in exceptional cases. You find rheumatism frequently with the older men. They try to avoid the extremely painful snowblindness by the use of snow goggles, which formerly consisted of wooden or leather eye-covers, in the middle of which there was a narrow slit, and which were fastened on the head with a thin thong. At the present time they use European snow-glasses, introduced by trade. Cripples are found not very rarely as a consequence of slight skill in the treatment of the sick and those who have met with accidents. Under the direction of the missionaries these now usually learn a trade suitable for them or make themselves useful in other ways. In 1906 there was a boy in Killinek, who [P. 266] was unable to stand upright and had to bend over constantly, so that he supported himself with his hands on his knees.

It is not easy to pass judgment in a few words on the mental peculiarities of the inhabitants. At first the women and children were shy with me. Whenever I came upon them over the hills and surprised some of them fishing, even with an Eskimo companion, they would leave their work at once and go to their tents. If we went over to the tents, they would vanish inside and close the entrance while they chattered softly and laughed. I left them undisturbed, and gradually they became less shy. I was glad to see that the Killinek women and children visited the mission steamer only in quite exceptional cases, while at the Christian stations farther to the south the whole community came on board, regarded the ship as their favourite recreation place, and even in the evening young girls stayed for hours in the crew's quarters. I learned to know most of the people of Killinek as being just as wise as they were peaceable and good natured. They were capable of thinking keenly, not only of districts situated near them, but also on entirely new subjects; they displayed a natural, just judgement and usually also a desire to be instructed further.

I consider these Eskimos as not at all inferior to the white race and on this account companionship with them on journeys is very pleasant. They have much practical knowledge and instinctive capabilities, which a European seldom possesses in like degree, and for this reason I prefer Eskimos as companions on Arctic journeys. I could also observe in many cases their good humour and readiness to help, their generosity, and hospitality. With foresight and kindness you can arrange everything with them, while they become stubborn quickly with threats and force, even spiteful and revengeful. They have a keen understanding of the difference between true good-will and calculating friendliness and rejoin with trust or mistrust. In their care-free attitude, bordering on light-mindedness, they are like children; they think too little of the future, enjoy [P. 267] the happiness of the moment in full measure, bear misfortune with patience, even equanimity and quickly forget times of need. They do not wish to learn how to save and be economical. They are, therefore, many times to blame, whenever great want comes to them, but they do not learn wisdom from the experience at all. They have a well-developed sense of tact, that is expressed in a pleasant way, particularly with the women. In most cases their behaviour is full of consideration, polite and well-mannered, so that you wonder why these characteristics must be cultivated in our children here at home with so much trouble and less success. Any sort of bold, importunate manner, which could be criticized never struck my attention with the Killinek women. I have really wondered about it in the case of these heathen; and lost confidence a little in the influence of culture and religion. I am not speaking of customs of a different kind, which naturally exist, but of the innermost being of these people, which commanded my respect and love. These Eskimos are in the majority, of a sanguine, often of a really optimistic, temperament. Merriment, which turns not rarely into unbridled pleasure, is peculiar to them. Therefore they are so often heard laughing, jesting and chatting together. They like companionship and after dark assemble almost regularly in the roomiest tent. They then sit together until far into the night, as if every day were a festival. They like to travel together in groups of several families when on journeys, as far as the hardships of the hunt and of fishing permit. They display a great desire to imitate white people. They are idle, full of desire to please and capricious and in general cling little to the old customs. There-

fore it happens, that the population has, in the last few decades, changed quite extraordinarily in outer respects. It is a sad experience for the ethnologist when he sees a people carelessly throw aside countless valuable acquisitions of their forefathers, and in addition to this sees them adopt as quickly as possible a Christian communion white-washed by European civilization, held up to them by representatives of culture and the mission, who seek their honour in it, without always enquiring with [P. 268] sufficient knowledge and pious reflection whether for these people the new is really better than the old! Because of lack of space I must refrain from giving examples of the strong desire for imitation, which, it is true, may be a sign of intelligence on the part of the population, but which appeared to me far more frequently in a more unpleasant, indeed more objectionable, form than in a praiseworthy way. Why do they wish to remodel all peoples according to a pattern, when experience teaches that our way leads neither to fulfillment nor to happiness! Killinek on the one hand, the Christian stations farther south in Labrador on the other hand, give many clear proofs of it, a fact which everyone must see, who does not shut his eyes on purpose, nor is seized by prejudiced opinions. That, with the advance of culture, other deplorable characteristics also arise among the people, such as covetousness, envy, hypocrisy, sensuality, and evident immorality, cannot be denied. These people are travelling the same path, which the Bible has strikingly characterized concerning the first men.

In their outward appearance the Killinek Eskimos make on the whole a favourable impression. They showed themselves in their clothing almost superior to the inhabitants of Rama and even to the stations situated more to the south. The reason for this may be found not only in the good teachings and admonitions of the missionaries, but also in the abundance of animal life in the district, and profitable pursuits. There is the possibility also of spending time and money to procure good clothing. At the present time their clothing is, as a rule, made in summer from European materials; in the winter the outer clothing at least more from seal skin or occasionally from caribou skin. The European style of dress has wrought a great change in the native costumes. Both sexes now frequently wear shirts of flannel or other goods, the men now a pair of under drawers, as well as a pair of outer trousers, fashioned in European style and often purchased ready made. The women wear either a pair of drawers from thick grayish white woolen material, or under these the old fashioned short fur breeches, which [P. 269] keep the body warm, and are said frequently to be sewed corresponding to the way the fur is distributed on the body of the animal: on the underside the soft white fur of the belly of the caribou, on the upper side the back parts of the animal. In the winter they wear fur outer breeches of different cut. At the present time most of the women put on dresses made of thin, gay-coloured materials; the few, who reject such clothing, usually wear fur breeches in the summer also. These dresses of the women adopted from the whites are doubtless a great hindrance to them in work and conduce to untidiness since they conceal torn and dirty underclothing. "But it does not look proper for women to run about in trousers as the men do," a worthy mission lady said to me, who perhaps also advocated the wearing of corsets by the Eskimo young women, as the fine house-, kitchen- and nurse-maids of the more southern stations like to do. With the men the upper part of the body is covered with a rather short jacket, generally made of white material, and often thickly padded, which they slip over the head, because it is closed in front and has no buttons of any kind. The upper back part runs out into a pointed hood, which is usually bordered about the opening encircling the face with a soft dog fur, but is only pulled up over the head in bad weather. The children, even the girls, wear a similar jacket; quite small children are placed in the hood naked or wrapped up in a cloth, the larger children wear a little jacket like a fur shirt. With the women on the edge of the front of the over-garment there is a rounded apron, which originally had for its purpose a symbolical covering of the parts of the body below it—as is evident in certain bands of Eskimos farther north. On the back, however, there hangs down a long-tail-shaped piece nearly to the ground: this represents an imitation of the tail of an animal. The head opening is very wide; it forms the opening for the large cowl-shaped hood meant for the reception of the child. This women's over-garment, in summer at least, is generally made of thick white woolen material and is trimmed on the edges, as are the jackets of the men, with red or other coloured beads. More and more rarely do they take the trouble to fashion the far more artistic over-garments from skins of the common seal or from the ringed seal. Then the beautifully marked well-cleaned pieces are used and, if necessary, the thinly scraped pieces, which they cut free-hand with the woman's knife, shaped like half a circle, and the pieces sewn with caribou sinew. Steel sewing needles at present are being introduced in great quantities by the trade, and have almost replaced the old needles

made from walrus teeth and bones. Much sense of form and skill is required to make fur garments of this kind, in beautiful, symmetrical patterns, that fit well. But the Labrador Eskimos are far behind the bands living farther north in this respect, and the skilled Greenland women. Under the softening influence of civilization the taste for their ancestral, suitable and beautiful style of dress is unfortunately disappearing. In the winter they protect themselves from the cold by thicker and more abundant under clothing. At the present time painted woolen jackets are popular. That woolen clothing of this kind suffers from considerable disadvantages as compared to complete fur clothing has been explained by different people who know the cold regions. The women frequently use cloths as head covering; the men, caps partly of native manufacture, partly of foreign make. Culture has not exerted any great influence on foot gear; the native style indeed has commonly been accepted by the white people. From strong, bearded seal leather they sew a boot-leg, closed in front, to which a turned-up sole is sewn. The sewing demands special skill. It is done with caribou sinew and then the leather is quite softened by soaking. Women's boots do not reach up to the knee; since they are open at the top, they are occasionally used as pockets. The boots of the men reach up to the knee and are pulled together with a string drawn through at the upper edge. In good condition such boots are quite water-tight and comfortable to wear. Holes are repaired with pieces set on the boots. They cover their feet with woolen socks or wind rags about them . . . they like to place grass, straw or moss in the soles of the boot. Since there are no sewed-in pockets in the primitive clothing, they tie on special fur pockets. [P. 271].

All pieces of clothing made of leather or skin have the disadvantage of becoming quite soft when wet, but they become hard as a board after drying, and cannot be put on in this state. Therefore it is the special evening work of the women to rub or scrape the half-dry shoes, jackets, etc., with a blunt stone, bone, piece of wood or the like, and to knead the pieces of clothing with their hands, until they are flexible again. This work often occupies several hours, demands skill and practice, which the men usually lack, and makes it desirable to take the women along on journeys. For longer expeditions the women are just as much needed, to repair the different pieces of clothing, especially shoes, which are worn through by daily use inside of a few weeks. To undertake very long journeys with men only is for this reason unprofitable. The Eskimos know this and act accordingly. Let no one think that taking women along is primarily for sensual reasons. The division of work between the sexes from early youth demands their two-sided activity for the preservation of life. The clothing is frequently washed by most people, especially in summer. The women wash the underclothing on Saturday at least, and hence the community living at the station often appears quite neat and fine at church on Sunday. That they wash the body, at least face, neck and arms, frequently, must likewise be mentioned. In respect to cleanliness the example set by the mission families has certainly exerted a favourable influence. There are always some people, who do not like to come into contact with water; others at times are forced by circumstances to neglect washing. It would be incorrect, however, to represent the Killinek people as really more uncleanly than the poor European population. Even the educated white man because of the inclemency of the climate is often kept from washing for days, if he does not live in a well-heated house. With adequate neatness the Eskimos have no marked specific odour for a normal nose. If [P. 272] it is claimed, that such an odour is noticeable after the enjoyment of large quantities of seal meat, then this observation may refer to external odours coming from bodies and clothing. Just as there is no taste for artistically decorated clothing, so their interest in jewelry or objects of adornment is slight. Probably this is due to the lack of any kind of bright metal, which was not taken up until contact with the white people. After the introduction of tin spoons—as a discovery in old graves caused me to assume—they seem to have hammered and also to have moulded little perforated bells and hemispheres from these spoons which they used for various borders. Later, when the Hudson's Bay Company carried on trade with the Eskimos, similar machine-made objects were introduced, and were also brought in up to later times. The women sewed hundreds of these little bells and hemispherical objects on a firm leather band and used this heavy, but valuable, glittering, tinkling piece of trimming as the lower border on the front apron of their over-garment. I found one such in possession of a somewhat elderly woman in good circumstances and secured it for the Ethnographical Museum in Dresden. Occasionally they make silver finger rings for themselves, by hammering small pieces of money into the desired shape. Of further articles of adornment they possess at the most only trifles, which visitors occasionally bring with them as gifts.

In dwelling conditions the Killinek Eskimos have, as a rule, preserved their primitive arrange-

ments. They live mostly in tents in the summer, which usually are now no longer cone-shaped, as formerly seems to have been often the case, but have two rectangular long sides and two triangular short sides. The frame work consists of wooden poles, which are pushed firmly in the ground, cross in the upper part, and are joined by a cross-pole and are made fast with ropes or thongs. Originally they made the tent cover from seal skins, of which perhaps thirty of the smaller ones are required, and which they must renew [P. 273] every two or three years. The ridge of the tent is open the whole length or only near the pole crossings so that the smoke can escape, but can be pulled together and made wind and rain proof. The hair side of the skins, which are sewed in such a way that the water runs off them easily, shows from the outside. At the present time though, they prefer to sell the skins, the preparation of which is troublesome, and purchase a cheaper sailcloth tent, which is far less protection. In 1906 there were only two skin tents in Killinek, in which it was far more comfortable in bad weather than in the cloth tents. To be sure the latter are lighter to carry when travelling. The tents are stretched and held in place by means of cords or thongs sewed on the sides which are tied to pieces of wood driven into the ground. They weight down the lower edge with large stones, which remain behind later as "tent-rings." The entrance, which is like a slit in the tent, is on the narrow side and can be completely closed. As a camp, a sheltered valley is chosen, or a sunny slope near the sea, if possible not too far from a clear pond or brook. With the aid of the whole family the tent is soon put up. Then they erect a raised platform of perhaps 1½ or 2 meters width in the half of the tent opposite the entrance. They cover this with moss, lichens and grass, and spread caribou skins over it. Thus there is formed a place to sit in the day and a sleeping place for the night. If there is driftwood in the vicinity, they build the fire place already described in the front part of the tent, occasionally in front of it. Besides this they set on a large flat stone the oil lamp, which is cut from soapstone, or fashioned from other material, and hang a cooking pot over it, usually from the tent poles.[32]

The old rectangular stone pots have gone out of use at the present time; [P. 274] only imported iron or tin dishes are in use now. As a rule the tent contains also a box, a small tub or a sort of trunk, in which the smaller belongings of the family are kept; the larger tools, pieces of clothing, provisions, etc., lie about in mothy disorder in all the corners. But it can be quite pleasant in the confined space, when it is filled by happy, contented people, and when too much wood smoke, which hurts the eyes, does not prevail. Usually each of the "better" families owns its own tent, in which eight to ten people find room with comfort; yet there are also starving ones who, uninvited, crowd in at their relatives', with kith and kin.

Many families erect a house in a place where they stay most of the time, and which they inhabit at least in spring and autumn. It is constructed with thick walls from stones and pieces of grassy turf, propped up with wooden posts and at the present time perhaps covered even with boards inside. Usually such sod houses are small, low, damp, set down in the ground half way, but have at the best a short entrance as a front building. The smoke escapes through a hatchway or a stove-pipe put up for the purpose. The one window on the low arched roof is made of stretched sealskin [gut]. They use this material also at the mission stations at least for the winter, in place of glass, because it does not dim, and remains unchanged even in the intense cold. A thick sheet of ice soon forms on the glass, which almost prevents the entrance of the light. Under the instruction of the missionaries the houses are now being built in much more roomy style and are more comfortable inside. Wooden buildings are even being erected, such as are common in the southern stations which have an abundance of wood. This does not seem to me practicable for the Killinek neighbourhood, which has so little wood. What is the use of a fine house, if you are cold in it! A small iron stove such as the Eskimos use occasionally, helps only if you have coal or wood, but that has become scarce even in the mission buildings. Let the old Eskimo houses be made somewhat roomier, brighter and healthier; let boards be used to sheathe them, and better ventilation be [P. 275] introduced, but desist from buildings which cannot be heated by oil lamps. The simple Icelandic or Greenland form of building can serve best as a model for this district.

(To be continued)

[32] In this work I must refrain from giving a more exact description of Eskimo tools, which in general correspond to those of other districts. Without illustrations a description is difficult to understand. A rather large number of the objects collected by me are now in the Anthropological Ethnographical Museum in Dresden (now the Tier-und Völkerkunde Museum).

AN ANNOTATED LIST OF VASCULAR PLANTS COLLECTED ON THE NORTH SHORE OF THE GULF OF ST. LAWRENCE, 1927-1930

By HARRISON F. LEWIS

(*Continued from page 40*)

GENTIANACEÆ

Gentiana nesophila Holm.

Betchewun, August 26, 1928, flat limestone of mainland near shore. Kegaska, August 15, 1928, banks of broken mussel-shell just above beach of Kegaska Island. Observed on St. Charles Island. Recorded by St. John from "Mingan island: île à la Chasse" only. Range extension, 82 miles E. Has been recorded from the mainland at Betchewun by Frère Marie-Victorin (1929, p. 60). Apparently this is the only place where this plant has so far been found growing on the mainland of North America.

Gentiana Amarella L.

Ste. Genevieve Island, August 23, 1928, limestone shingle above beach. Kegaska, August 14, 1928, common in turf near shore on Green Island. Observed also at Seven Islands (Manowin Island), mouth of Matamek River, Thunder River, and Kegaska Island.

**Gentiana linearis* Froel.

Natashquan, August 7, 1927, and August 17, 1928, border of brackish marsh beside the Little Natashquan River.

Lomatagonium rotatum (L.) Fries, f. *americanum* (Griseb.) Fernald.

Mascanin, August 20, 1928, small, shallow patch of gravel near the shore of an outer granitic island. Natashquan, September 8, 1927, turfy roadside, and September 10, 1927, brackish marsh at shore. Kegaska, September 4, 1927, turf margin of outer points along shore, and August 14, 1928, turf near shore of Green Island. Bonne Esperance, August 22, 1927, grassy turf beneath fish flakes. Greenly Island, August 26, 1927, grassy turf.

Halenia deflexa (Sm.) Griseb.

Wolf Bay, July 31, 1927, damp, rich soil on the island called "The Black Land". Lake Island, July 29, 1927, in turf at top of sea-cliff.

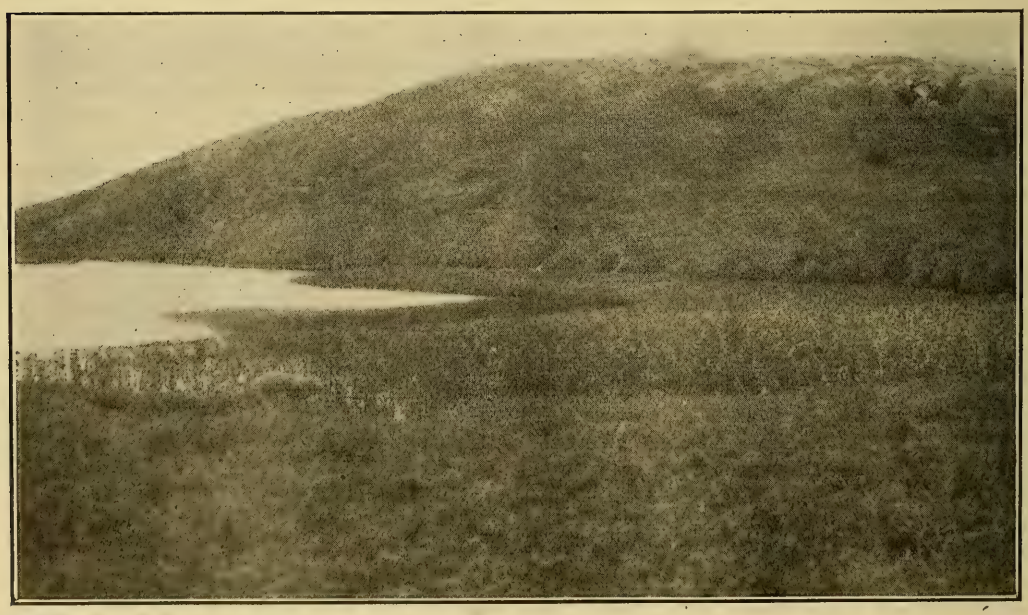
Menyanthes trifoliata L., var. *minor* Michx.

Natashquan, June 28, 1928, in 3 inches of water in pond in marsh beside the Little Natashquan River. Mutton Bay, July 9, 1927, shallow pond near shore. In 1928 first seen in bloom at The Bluff Harbour on June 20. Recorded by St. John as *Menyanthes trifoliata* L.

BORAGINACEÆ

Mertensia maritima (L.) S. F. Gray.

St. Mary Islands, July 27, 1927, damp valley



Invasion of a shallow pond by *Menyanthes trifoliata*, var. *minor*, on St. Mary Islands.

on Cliff Island. Anse des Dunes, July 13, 1928, upper border of gravel beach.

LABIATÆ

Scutellaria epilobiifolia Ham.

Kegaska, August 14, 1928, abundant in turf on Green Island. Romaine, August 10, 1928, foot of sandy bank, top of sand beach. Observed at Natashquan and Mascanin. Recorded by St. John as *Scutellaria galericulata* L.

GALEOPSIS TETRAHIT L., var. BIFIDA (Boenn.) Lej. & Cout.

Kegaska, August 12, 1927, dooryard. Sholiaban, July 23, 1928, dooryard.

**Stachys palustris* L.

Natashquan, September 8, 1927, damp roadside. Possibly introduced.

Lycopus uniflorus Michx.

Natashquan, August 5, 1927, damp hollow in dunes. Kegaska, August 14, 1928, damp turf on Green Island.

**Mentha arvensis* L., var. *canadensis* (L.) Briquet.

Betchewun, August 25, 1928, grassy clearing. Possibly introduced.

**Mentha arvensis* L., var. *glabrata* (Benth.) Fernald.

Mingan, August 30, 1928, sand flat beside Mingan River.

SCROPHULARIACEÆ

Limosella aquatica L.

St. Mary Islands, July 23, 1927, small pool in rock.

**Limosella subulata* Ives.

Aylmer Sound, August 18, 1927, wet, sandy beach on west side of Little Mecatina Island.

Veronica scutellata L.

Natashquan, August 9, 1927, damp border of slough in sand dunes.

Veronica humifusa Dickson.

Blanc Sablon, July 11, 1928, wet ground near cold streams, east side of river.

Melampyrum lineare Lam.

Betchewun, August 25, 1928, open grassland near coniferous woods. Natashquan, August 5, 1927, open, sandy woods. Lake Island, August 6, 1928, north-facing turfy slope.

Euphrasia purpurea Reeks, var. *Farlowii* (Robinson) Fernald & Wiegand.

Kegaska, August 14, 1928, dry, broken mussel-shell near shore of Green Island. Fog Island Sanctuary (island in), August 1, 1927, crevices in rock.

Euphrasia purpurea Reeks, var. *Randii* (Robinson) Fernald & Wiegand.

Natashquan, August 17, 1928, upper border of brackish marsh beside Little Natashquan River. The Bluff Harbour, August 1, 1927, higher part of marsh on big island.

Euphrasia disjuncta Fernald & Wiegand.

Kegaska, August 14, 1928, dry, broken mussel-shell above beach on Green Island.

Euphrasia arctica Lange.

Thunder River, September 2, 1928, border of field. Betchewun, August 26, 1928, foot-path. Natashquan, August 5, 1927, door-yard sod. Recorded by St. John from "Archipel du Petit-Mécatina: îles Netagamiou" only. Range extension, 237 miles W.

Rhinanthus oblongifolius Fernald.

Natashquan, August 5, 1927, sandy dooryard, and August 6, 1927, bare, rocky hillside near road. Fog Island, August 9, 1928, turfy slope. Lake Island, July 29, 1927, shallow soil on rock beside shore. Harrington Harbour, July 25, 1928, sand and clay bluff beside shore of mainland. La Tabatière, July 21, 1928, dry turf beside shore. Anse des Dunes, August 26, 1927, grassy hollow in dunes.

LENTIBULARIACEÆ

Utricularia vulgaris L., var. *americana* Gray.

Natashquan, August 5, 1927, in 6 inches of water in shallow pond. Recorded by St. John from "the calcareous region of Mingan islands, and strait of Belle Isle" only.

Utricularia intermedia Hayne.

Natashquan, August 7, 1927, pool in brackish marsh near mouth of Little Natashquan River. Recorded by St. John from "Pointe-aux-Esquimaux (Havre St. Pierre); and Mingan islands; île à la Chasse" only. Range extension, 57 miles E.

Utricularia cornuta Michx.

Havre St. Pierre, August 28, 1928, wet bog.

Pinguicula vulgaris L.

Lake Island, July 18, 1927, very shallow soil on solid granitic rock at crest of hill. St. Mary Islands, July 22, 1927, boggy hill-crest on eastern island. Lourdes de Blanc Sablon, July 12, 1928, damp slope of hill, on calcareous sandstone.

PLANTAGINACEÆ

PLANTAGO MAJOR L.

Natashquan, August 7, 1927, dooryard.

Plantago juncoides Lam., var. *glauca* (Hornem.) Fernald.

Natashquan, August 7, 1927, brackish marsh near mouth of Little Natashquan River. Wapitagun, July 14, 1927, cleft in rock on Matchiatik Island. Included by St. John under *P. decipiens* Barneoud.

Plantago juncoides Lam., var. *decipiens* (Barneoud) Fernald.

Ste. Genevieve Island, August 23, 1928, limestone shingle at top of beach. The Bluff Harbour, August 1, 1927, in salt marsh on big island. Included by St. John under *P. decipiens* Barneoud.

RUBIACEÆ

Galium trifidum L., var. *halophilum* Fernald & Wiegand.

Pointe au Maurier, July 13, 1927, small island. Aylmer Sound, August 18, 1927, brookside in swamp of larch and alder on Little Mecatina Island. Little Rigolet, August 29, 1927, on seaweed on shore of cove on Mauger Island.

Galium Claytoni Michx.

Natashquan, August 9, 1927, damp border of slough in sand dunes. Kegaska, August 14, 1928, sheltered brookside at high tide mark. Recorded by St. John from "Natashkwan" only. Range extension, 24 miles E.

**Galium Claytoni* Michx., var. *subbiflorum* Wiegand.

Natashquan, August 7, 1927, border of fresh marsh beside Little Natashquan River.

Galium labradoricum Wiegand.

Kegaska, August 14, 1928, among grass and sedges in a marsh on Green Island. The Bluff Harbour, August 1, 1927, grassy and sedgy edge of brackish marsh. Etamamu River (island off mouth of), July 20, 1927, damp ground just above the beach. Blanc Sablon, August 26, 1927, sphagnum bog, west side of river.

**Galium asprellum* Michx.

Thunder River, September 2, 1928, three feet high among alders on river bank.

Galium triflorum Michx.

Wolf Bay, August 13, 1927, wet, mossy woodroad. Harrington Harbour, July 25, 1928, damp thicket on sand on mainland. Observed on mainland at Betchewun. Not recorded by St. John west of "Boishébert: baie des Moutons". Range extension, 197 miles W.

CAPRIFOLIACEÆ

Lonicera villosa (Michx.) R. & S.

Bradore Bay, June 28, 1927, turfy bank beside brook on calcareous sandstone. Recorded by St. John as *Lonicera cærulea* L., var. *villosa* (Michx.) T. & G.

Lonicera villosa (Michx.) R. & S., var. *calvescens* (Fernald & Wiegand) Fernald.

Seven Islands, September 12, 1928, top of gravel beach on Manowin Island. Aylmer Sound, August 18, 1927, dry, sandy plain on west side of Little Mecatina Island. La Tabatière, July 7, 1927, foot of grassy hillside. Reported by St. John as *Lonicera cærulea* L., var. *calvescens* Fernald & Wiegand, but from Seven Islands only. Range extension, 344 miles E.

Linnæa borealis L., var. *americana* (Forbes) Rehder.

Lake Island, July 18, 1927, turfy bank near shore. Little Rigolet, July 20, 1928, border of coniferous woods beside cove near Rapide Lessard.

Viburnum pauciflorum Raf.

Kegaska River, June 23, 1928, stunted bushes on open, sandy land above beach near mouth of river. Watagheistic Island, July 30, 1928, wet, wooded ravine. La Tabatière, July 7, 1927, wooded hillside.

Viburnum cassinoides L.

Thunder River, September 2, 1928, near base of granitic slope. Mascanin, August 20, 1928, dry, bushy hillside in shelter of low cliff.

**Sambucus racemosa* L.

Mascanin, June 20, 1929, in birch grove near head of bay, about a quarter of a mile from tide water. Discovered and shown to me by E. C. Abbe. Recorded as "*Sambucus pubens*" from an indefinite locality ("depuis Godbout jusqu'à Moisie") by Lemay (1923).

CAMPANULACEÆ

Campanula rotundifolia L.

La Tabatière, July 21, 1928, fine gravel near shore. Lourdes de Blanc Sablon, August 26, 1927, shallow, wooded hollow. Observed also on Manowin Island, on mainland near Seven Islands, and near mouth of Matamek River. Abundant in region of Mingan Islands. Not recorded by St. John east of "Bois-hébert: Tabatière". Range extension, 86 miles E.

**Lobelia Kalmii* L.

Quarry Island, September 5, 1929, marshy border of small pond.

(To be concluded)

NOTES AND OBSERVATIONS

THE MOCKINGBIRD (*Mimus polyglottos*) IN CENTRAL ALBERTA.—The following appeared in the *Pioneer*, a local weekly published at Disdbury, Alberta, on June 21st, 1928:

"In the garden of Mr. McNaughton, west of town, a pair of mockingbirds have built a nest, and may be seen any time during the day unconcernedly pursuing their domestic avocations.

"Mr. McNaughton states that their nest is in a pine tree a short distance from the house and, as the birds appear quite tame, they can be approached to within a few feet without causing any commotion.

"The robin, he says, is copied exactly and the notes of other birds, too, may be distinguished from time to time.

"So far as one can learn, this is the first time the mockingbird has been seen so far north, and Didsbury, consequently, may consider itself to be especially favoured.

"Mr. McNaughton has gone to the trouble of obtaining accurate information, and has no doubt that he has in his garden the genuine article.

I have known Mr. McNaughton for a number of years and have obtained the following further particulars from him.

The nest contained four eggs and the young were successfully hatched and were beginning to feather, when they died from exposure during a spell of cold rainy weather.

The birds built again in a neighbouring pine tree and this time succeeded in rearing a brood of three.

The old birds were seen feeding the young after they left the nest, and the whole family stayed around the garden until the early part of September.

Mr. McNaughton's son, Roy, took a number of pictures of the birds and I think they will be sufficient to establish their identity.

Didsbury is situated about 50 miles south of Red Deer, just where the prairies of southern Alberta merge into the park lands of the central portion of the Province.

It is approximately in lat. 51° 40′ North and long. 114° 10′ West.—C. H. SNELL.

Accompanying the above communication were three photographs of the bird in question. They are plainly recognizable as Mockingbirds. The slim outline, unmarked face-long tail with white outer feathers, general dull colouration and white wing spots are well shown and quite diagnostic. Unfortunately, these details, obvious enough in the originals, would probably not show as convincingly in half-tone reproduction.—ORNITHOLOGICAL EDITOR.

ON THE OCCURRENCE OF THE CLAY-COLOURED SPARROW (*Spizella pallida*) AT TORONTO.—On May 28th, 1931, while passing through Lawrence Park, a residential suburb in North Toronto, I heard a song that was unfamiliar to me. The bird was plainly visible on a telephone wire, but satisfactory observation was impossible since the sun was rising immediately behind it, while a series of private gardens prevented an approach from the rear. On describing the note and general appearance of the bird to members of the staff of the Royal Ontario Museum of Zoology, they suggested that it was probably a Clay-coloured Sparrow. Returning later in the day with Mr. James Baillie, Jr., and Mr. Shortt of the Museum, the bird was heard, but not seen. Next morning, however, May 29th, it was clearly seen by these two observers as well as by several others, including myself. On the 30th a number of members of the Brodie Club watched it at close range, but that was its last appearance. Although it was impossible to collect the specimen within the city limits, I feel that the record may be regarded as indisputable in view of the number of observers and the excellent opportunities for observation.

This appears to be the first record of the bird at Toronto. In the Toronto *Evening Telegram* for June 20th, Mr. Baillie has recorded previous observations for Ontario. Though typically a bird of the plains, Mr. Baillie writes that the Clay-coloured Sparrow has been found in the Rainy River district, near Port Arthur, and at Sault Ste. Marie. In 1894 Mr. W. E. Saunders found the bird at Strathroy; it appeared there again in 1922, and at London in 1923 and 1924. In 1930 a single specimen was collected at Lake Simcoe. It is apparent that the Clay-coloured Sparrow is a rare wanderer to southern Ontario, a few specimens having become separated from others of their kind by the forests around Lake Superior and Lake Huron.—T. F. MCILWRAITH.

SOLITARY SANDPIPER'S NIGHT MANOEUVERS.—It is well known that the shore birds as a family respond readily to imitations of their calls. Unfortunately this failing has led to great reductions in the numbers of such as are considered game by the pot-hunter.

This summer I experienced one of those thrills in decoying a sandpiper which proved as keen to me at the time, as the thrill which comes to a gunner who sees the plover flock come into range of his whistle.

I was crossing a still glassy lake in Algonquin Park alone one clear starry night. As I drifted along I heard from the darkness, some distance off, the shrill call of the Solitary Sandpiper. As I answered it from time to time, I noticed the note came from different directions. Evidently the bird was flying about. Only the night before I had heard this same species flying and whistling in the darkness. To-night the bird who responded

was apparently seeking its kind. After repeated calls I heard the fluttering of wings poising in the still air near my canoe. Then the bird was gone again, and calling from afar. Again and again I answered as the notes came from now here and now there, but always drawing nearer. And again I heard the fluttering of wings close to my head. Judge my surprise and delight to see, dimly in the gloom, a tiny whitish form settle on the gunwale of my canoe and rest a moment while I remained motionless and breathless. Away it went calling here and there, far and near, while I answered its shrill whistle. Once more I heard the soft rustle of wings and once more the little voyager of the darkness perched on the side of the canoe, remaining long enough for me to see the slim little form, a paddle's length away. Then for the last time it was gone into the night.

Of course it was all a very natural occurrence. The bird was flying about at night probably feeling the restless urge of the coming migration season. It heard the call of its species and following the sound, located the source in the midst of a smooth lake and true to its usual diurnal habit, it settled on what appeared to be a floating log, no other perch being available. No doubt the bird was puzzled and after a couple of attempts to find the other bird, it flew off never to return.

Be it all as it may, to a bird student it provided one of those delightful little thrills which come now and then as one learns Nature's little secrets of the night.—STUART L. THOMPSON.

MOURNING DOVES.—About the 20th of August, 1931, I observed a pair of "mourning doves', in the Manito Forest Reserve in township 42 range 24, West of Third Meridian, Sask. (latitude 51½° N.). This is the first time that I have heard of mourning doves being seen in this distrct. —S. HUMPHRY.

EVENING GROSBEAK SEEN FEEDING ITS YOUNG IN MUSKOKA.—I should like to report that Evening Grosbeaks of both sexes in numbers of five to twenty, have been seen constantly this spring and summer (1931) at Camp Billie Bear, Bella Lake, Muskoka.

While I was there in the latter part of May and June, a few could always be seen picking on the ground in front of the ice-house, or in the wild cherry trees surrounding the camp. Occasionally a few would fly northwards over the lake. After my return a friend who was still in camp wrote to me as follows:

"For some time I have been going to write to you about the Evening Grosbeak, for one night, coming over from the dining-room, I saw in the cherry tree behind my cabin a male Evening Grosbeak feeding a baby bird. It wasn't as strikingly marked as the male bird, but it had the spotted, untidy and awkward look of a young bird, it seemed wobbly and as though most uncertain about the use of its wings, just as though it had not been long off the nest. I saw them both distinctly, so it seems to be proved that the Evening Grosbeak nests here. . . . I do not know the exact date when I saw the young bird, but it was within a day or two of the first of July. I have not seen any of them since the seventeenth, when in the early evening we all three of us saw five of the Grosbeaks on Brother's tree pole. It was a wonderful sight. At least one of the birds was a full-grown male, two were very evidently young birds. I could not be quite sure of the others but I think one was a full-grown female and the other a young bird. . . . One of the men here says that he, too, saw the Grosbeak feeding a young one."

As this camp site is just a clearing on a small lake, seven miles to the south-east of Algonquin Park, the woods on both sides are so dense that unless one knew where to look for the nest, it would be like looking for a needle in a haystack. We hope, however, sometime in the future we may come upon one.—ANNA E. MACLOGHLIN.

THE NATIONAL MUSEUM OF CANADA.—The Canadian public are manifesting an encouraging interest in subjects pertaining to natural history and other scientific matters according to the 1929 report of the National Museum of Canada recently issued by the Department of Mines, Ottawa: and with a view to satisfying this interest the Museum staff are aiming their best efforts. In the musuem halls attractive material in the possession of the institution is displayed with legible labels giving information of a popular and scientific nature. Guides and instructors are provided for groups of tourists, students, and teachers if requested. Two courses of lectures are given each winter in the lecture hall of the museum. The lectures are given to children on Saturday mornings and to adults on Wednesday evenings. During the winter of 1929-30 the average morning attendance was 600 and the evening attendance 222.

Educational work of popular and semi-scientific character outside of Ottawa is not neglected and efforts are being made to extend it. Lantern slides illustrating a variety of topics are lent to *bona fide* lecturers and teachers. Use is also made of the moving picture for carrying on educational work throughout the country and a library of films is gradually being acquired.

Permission is given to members of the museum staff to acceed to the requests of various organizations for the delivery of lectures on subjects on which such members are specially qualified to

speak. As these members are engaged during the summer months in field work broadly distributed throughout Canada their lectures reach a widespread public.

Assistance is given to local museums, particularly in suggestions as how to display to the best advantage the material in their collections. Sets of economic minerals, rock-forming minerals and rocks are prepared for sale to educational institutions. Smaller sets are prepared for prospectors and students.

The National Museum also offers opportunities to commercial artists for suggestions in design. A great many whose interest has been aroused have received assistance by visiting the museum and discussing the subject with members of the staff.

Those who have followed musical developments in Canada during recent years are impressed with the popularity attained by the folk song. Much credit for this popularity is due to C. M. Barbeau of the staff who has made a special study of Indian and French-Canadian songs. These have been brought to the attention of the public by lectures and in connection with handicraft festivals and exhibits.

BOOK REVIEWS

NATURE NARRATIVES. VOL. 2. *By Austin H. Clark. Baltimore: Williams & Wilkins Co. 1931. 100 pp.*

This sequel to Nature Narratives, which was reviewed in *The Canadian Field-Naturalist* 45: 93, April, 1931, is just as full of interesting material as was the first volume. It is the kind of book that should be found in every school library, and should do much to induce the amateur naturalist to turn his attention to the study of the habits of living animals rather than to the compiling of "local lists of species" important though these are. Birds, butterflies, bacteria, bees, beetles, all are there and many surprising and amazingly interesting facts about their lives and habits are related.—D.L.

THE RIDDLE OF MIGRATION. *By William Rowan. Baltimore. The Williams & Wilkins Company. 1931. Price $2.00.*

In this compact little volume of 150 pages, Dr. Rowan presents in relatively simple terms his views as a general biologist on the subject of bird migration, including a brief summary of the experiments that he has conducted in Alberta with Crows and Juncos and the results obtained thereby.

After pointing out the complex and difficult nature of the problems raised by the known facts of bird migration, Dr. Rowan begins his account of the subject with "a brief survey of bird structure and function". The numerous adaptations of the bird to its environment and mode of life and the very limited intelligence that can at best result from the functioning of its nervous system which, as compared with that of a mammal, is lacking in intricacy of development, are both emphasized. The gonads and their part in governing the activities and development of the individual are considered at some length.

Having reviewed these fundamental facts, the author next discusses the environment, past and present, of birds, and the observed phenomena of migration. He points out that an investigation of bird migration should concern itself with "two quite distinct things (*a*) Factors of the past that have induced and built up the migratory custom; (*b*) Factors of the present that annually set the migratory machinery in motion".

In an interesting chapter on the evolution of migrations there is presented the theory that evolution arose through long periods of preglacial time by the operation of natural selection, working through seasonal climatic factors, on bird forms that originally tended to wander indiscriminately, as some still do to a large extent, but that were forced into regular rhythmic movements by the above-mentioned factors because the area that, at the proper season, provided their environmental requirements for reproduction failed, at some other season, to provide even the environmental requirements for survival of the existing individuals of the species. Those that failed to keep time with the succession of the seasons generally perished without adequate reproduction. It is pointed out that the fact that institution of regular migrations by this process involved the loss of incredible numbers of birds or took hundreds or even thousands of years to bring about is immaterial. "Millions of birds and millions of years have been available." While the great northern glaciations doubtless affected migration, they did not establish it; it must have antedated them.

The aid of the Lamarckian hypothesis of the inheritance of acquired characters is invoked to explain the development of migration in many species to its present status, where, for want of some better concept, we call it inherited instinct, but the author carefully and properly reminds

us that this explanation is at present a mere assumption, lacking adequate support. Lamarck's hypothesis is unproven.

Dr. Rowan then comes to the heart of his story —the account of his own experimental manipulations of Juncos and Crows in Alberta and the results obtained thereby. His work with Juncos was described at greater length in his earlier paper, "Experiments in Bird Migration", which was reviewed in *The Canadian Field-Naturalist*, 44: 70, March, 1930, and his subsequent experiments with Crows resembled those made with the Juncos. By artificially controlling, through the length of the daily period of light supplied or by other means, the length of the daily period of activity, so that it increased or decreased at the will of the experimenter, Dr. Rowan was able to bring about histological changes in the gonads of his birds, accompanied, apparently, in spite of adverse conditions of weather and temperature, by changes in the intensity of the instinctive desire to migrate. He therefore believes that the internal stimulus that is the immediate cause of migratory movement is a hormone produced by the interstitial tissue of the reproductive glands; that this tissue is most abundant and active when the gonads are increasing or decreasing in size, and that increase or decrease in their size is brought about by increasing or decreasing daily periods of physical activity, which, in the temperate zones, are normally conditioned by the daily increase or decrease in the length of the daylight period.

Dr. Rowan has provided a most readable account of the interesting question of bird migration and of the valuable advances in knowledge that he, by experimental methods, has succeeded in making in connection with it, and he leaves it still, in large measure, a riddle to be studied and elucidated, probably little by little, by ornithologists and other biologists who are and will be attracted by its "deep and lasting appeal".—H.F.L.

OFFICIAL CANADIAN RECORD OF BIRD-BANDING RETURNS

Published by authority of the National Parks of Canada Branch, Department of the Interior, Canada

RETURNS UPON BIRDS BANDED IN 1926

DOUBLE-CRESTED CORMORANT, No. 201,431, juv., banded by Harrison F. Lewis, on Cormorant Rocks, Cape Whittle Sanctuary, Saguenay County, Quebec, on August 10, 1926, was caught in a fish net at Quonochontaug Pond, Rhode Island,—reported on April 28, 1930. The bird was dead when recovered from the net and had been found fully two years before it was reported.

HERRING GULL, No. 457,198, banded by Clarke C. Miller, at Little Cass Island, Detour Passage, Chippewa County, Michigan, on July 19, 1926, was caught at Pefferlaw, Ontario, on January 8, 1930.

FRANKLIN'S GULL, No. 446,862, yg., banded by Prof. Wm. Rowan, at Beaverhills Lake, Alberta, on June 25, 1926, was found dead at Guckeen, Minnesota, during the fall of 1929.

CHIMNEY SWIFT, No. A69,761, ad., banded by A. Burton Gresham, at North Kildonan, Manitoba, on August 11, 1926, was found in an injured condition, at Winnipeg, Manitoba, on May 17, 1930. The bird died a few hours after it was found.

RETURNS UPON BIRDS BANDED IN 1927

COMMON MALLARD, No. 597,162, banded by F. H. Rose, at Moiese, Montana, on November 25, 1927, was caught at Golden, British Columbia, during the fall of 1929.

BLACK DUCK, No. 557,614, banded by W. B. Large, at Rochester, New York, on December 4, 1927, was caught in a muskrat trap and released in Chisholm Township, Nipissing District, Ontario, on April 25, 1930.

CALIFORNIA GULL, No. 544,245, yg., banded by Frank L. Farley, at Gull Island in Bittern Lake, twelve miles west of Camrose, Alberta, on June 22, 1927, was found dead at Kathyrn, Alberta, on June 6, 1930.

BRONZED GRACKLE, No. 279,905, im., banded by George Lang, at Indian Head, Saskatchewan, on June 26, 1927, was killed at Sintaluta, Saskatchewan, during the month of April, 1930.

RETURNS UPON BIRDS BANDED IN 1928

DOUBLE-CRESTED CORMORANT, No. 303,837, banded by Bert Lloyd, at the north end of Last Mountain Lake, Saskatchewan, on July 21, 1928, was shot in Rice County, Minnesota, on April 26, 1930.

COMMON MALLARD, No. A615,050, banded by F. H. Rose, at Moiese, Montana, on October 5, 1928, was shot at Buffalo Lake, 17 miles north west of Stettler, Alberta, on October 7, 1929.

COMMON MALLARD, No. A615,431, banded by F. H. Rose, at Moiese, Montana, on October 9, 1928, was shot at Waskatenau, Alberta, on September 27, 1929.

COMMON MALLARD, No. A615,646 banded by F. H. Rose, at Moiese, Montana, on October 11, 1928, was shot at a place 15 miles north of Edmonton, Alberta, on September 23, 1929.

COMMON MALLARD, No. A615,696, ad., f., banded by F. H. Rose, at Moiese, Montana, on October 12, 1928, was shot at Sylvan Lake, Alberta, on October 29, 1929.

COMMON MALLARD, No. A615,787, im., m., banded by F. H. Rose, at Moiese, Montana, on October 13, 1928, was shot at Alcomdale, Alberta, on November 2, 1929.

COMMON MALLARD, No. A615,849, im., m., banded by F. H. Rose, at Moiese, Montana, on October 13, 1928, was recovered at Clyde, Alberta, on April 11, 1930.

COMMON MALLARD, No. A615,897, im., m., banded by F. H. Rose, at Moiese, Montana, on October 13, 1928, was shot at Tompkins, Saskatchewan, on October 30, 1929.

COMMON MALLARD, No. A616,066, ad., m., banded by F. H. Rose, at Moiese, Montana, on October 17, 1928, was shot at Warner, Alberta, on October 28, 1929.

COMMON MALLARD, No. A616,155, banded by F. H. Rose, at Moiese, Montana, on October 18, 1928, was shot at Pincher Creek, Alberta, on October 3, 1929.

COMMON MALLARD, No. A616,690, banded by F. H. Rose, at Moiese, Montana, on October 23, 1928, was found dead at Calgary, Alberta, on June 4, 1930.

COMMON MALLARD, No. A616,837, banded by F. H. Rose, at Moiese, Montana, on October 24, 1928, was shot at Burnt Lakes, Alberta, on or about September 16, 1929.

COMMON MALLARD, No. A616,878, ad., m., banded by F. H. Rose, at Moiese, Montana, on October 24, 1928, was shot at Lac Ste. Anne, Alberta, on December 29, 1929.

COMMON MALLARD, No. A618,823, ad., f., banded by F. H. Rose, at Moiese, Montana, on October 24, 1928, was shot at Atikameg, Alberta, on July 25, 1929.

COMMON MALLARD, No. A616,955, banded by F. H. Rose, at Moiese, Montana, on October 25, 1928, was killed at Hay Lake, about 150 miles north west of Fort Vermilion, Alberta, on May 10, 1929.

COMMON MALLARD, No. A616,964, banded by F. H. Rose, at Moiese, Montana, on October 25, 1928, was shot at Bear Lake, about 20 miles north west of Grande Prairie, Alberta, on September 24, 1929.

COMMON MALLARD, No. A616,980, banded, by F. H. Rose, at Moiese, Montana, on October 25, 1928, was shot at Wrentham, Alberta, on October 3, 1929.

COMMON MALLARD, No. A617,046, banded by F. H. Rose, at Moiese, Montana, on October 26, 1928, was shot at Pincher Creek, Alberta, on September 26, 1929.

COMMON MALLARD, No. A617,139, banded by F. H. Rose, at Moiese, Montana, on October 27, 1928, was shot at Pincher Creek, Alberta, on September 20, 1929.

COMMON MALLARD, No. A617,361, banded by F. H. Rose, at Moiese, Montana, on October, 30, 1928, was captured at Grouard, Lesser Slave Lake, Alberta, on April 20, 1929.

COMMON MALLARD, No. A617,452, ad., f., banded by F. H. Rose, at Moiese, Montana, on November 1, 1928, was shot at Red Deer, Alberta, on September 25, 1929.

COMMON MALLARD, No. A617,533, banded by F. H. Rose, at Moiese, Montana, on November 1, 1928, was shot at Rowley, Alberta, on September 17, 1929.

COMMON MALLARD, No. A616,770, ad., m., banded by F. H. Rose, at Moiese, Montana on November 2, 1928, was shot at Markerville, Alberta, on November 10, 1929.

COMMON MALLARD, No. A617,988, banded by F. H. Rose, at Moiese, Montana, on November 4, 1928, was shot at the Samson Indian Reservation, Hobbema Agency, Alberta, on October 10, 1929.

COMMON MALLARD, No. A618,133, banded by F. H. Rose, at Moiese, Montana, on November 5, 1928, was shot at a place 20 miles south of Red Deer, Alberta,—reported on September 23, 1929.

COMMON MALLARD, No. A618,156, banded by F. H. Rose, at Moiese, Montana, on November 5, 1928, was shot at Hussar, Alberta, on September 28, 1929.

COMMON MALLARD, No. A602,703, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 9, 1928, was shot at Pitt Meadows, British Columbia, on December 8, 1928.

COMMON MALLARD, No. A602,704, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 9, 1928, was shot at Sumas Prairie, British Columbia, on December 12, 1928.

COMMON MALLARD, No. A602,708, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 9, 1928, was shot at Dewdney, British Columbia, on January 28, 1929.

COMMON MALLARD, No. A602,711, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 9, 1928, was shot at the Chehalis Indian Reserve, Harrison River, British Columbia, on December 20, 1928.

COMMON MALLARD, No. A602,714, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 9, 1928, was shot at Sumas Prairie, British Columbia, on November 10, 1928.

COMMON MALLARD, No. A602,719, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack British Columbia, on November 9, 1928, was shot at Sumas Prairie, British Columbia, on or about November 10, 1928.

COMMON MALLARD, No. A602,734, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 9, 1928, was killed at Sauvies Island, Oregon, on December 8, 1929.

COMMON MALLARD, No. A602,741, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 9, 1928, was found wounded at Bellingham, Washington, on December 26, 1928.

COMMON MALLARD, No. A602,753, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 9, 1928, was shot in the same locality in which it was banded, on December 10, 1928.

COMMON MALLARD, No. A618,488, banded by F. H. Rose, at Moiese, Montana, on November 9, 1928, was shot at New Norway, Alberta, on September 21, 1929.

COMMON MALLARD, No. A602,754, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 10, 1928, was found dead in the same locality in which it was banded, on December 13, 1928.

COMMON MALLARD, No. A617,821, banded by F. H. Rose, at Moiese, Montana, on November 13, 1928, was shot at Pincher Creek, Alberta, on September 20, 1929.

COMMON MALLARD, No. A602,757, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on

November 15, 1928, was shot at Nicoamen, British Columbia, on December 18, 1928.

COMMON MALLARD, No. A602,763, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Sumas Prairie, British Columbia, on December 13, 1928.

COMMON MALLARD, No. A602,766, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Matsqui, British Columbia, on November 21, 1928.

COMMON MALLARD, No. A602,771, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was killed at a place 25 miles from where it was banded, on November 16, 1928.

COMMON MALLARD, No. A602,775, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Sumas Prairie, British Columbia, on November 16, 1928.

COMMON MALLARD, No. A602,779, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot on the Pitt River, 10 miles east of New Westminster, British Columbia, on November 20, 1928.

COMMON MALLARD, No. A602,784, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Chilliwack, British Columbia, on November 16, 1928.

COMMON MALLARD, No. A602,792, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was killed on the Umatilla River, near Umatilla, Oregon, on November 27, 1929.

COMMON MALLARD, No. A602,794, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Sumas Prairie, British Columbia, on November 15, 1928,

COMMON MALLARD, No. A602,799, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was killed at Lulu Island, British Columbia, on January 23, 1929.

COMMON MALLARD, No. A602,800, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was found dead in the same locality in which it was banded, on December 12, 1928.

COMMON MALLARD, No. A602,807, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot on the Harrison River, British Columbia, on November 25, 1928.

COMMON MALLARD, No. A602,808, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Barney Lake, 6 miles north of Mount Vernon, Washington, on December 17, 1928.

COMMON MALLARD, No. A602,817, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Sumas Prairie British Columbia, on November 15, 1928.

COMMON MALLARD, No. A602,819, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Sumas Prairie, British Columbia, on December 3, 1928.

COMMON MALLARD, No. A602,821, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Sumas Prairie, British Columbia, on December 27, 1928.

COMMON MALLARD, No. A602,827. m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Chilliwack, British Columbia, on November 16, 1928.

COMMON MALLARD, No. A602,832, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was found dead in the same locality in which it was banded, on January 6, 1929.

COMMON MALLARD, No. A602,838, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Hatzic Prairie, British Columbia, on November 18, 1928.

COMMON MALLARD, No. A602,852, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Sumas Prairie, British Columbia, on December 9, 1928.

COMMON MALLARD, No. A602,853, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was killed at Sumas Lake, in the Fraser River Valley, 50 miles east of Vancouver, British Columbia, on November 17, 1928.

COMMON MALLARD, No. A602,855, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 15, 1928, was shot at Sumas Prairie, British Columbia, on November 25, 1928.

COMMON MALLARD, No. A618,975, ad., f. banded by F. H. Rose, at Moiese, Montana, on November 15, 1928, was shot at Lesser Slave Lake, Alberta, on September 7, 1929.

COMMON MALLARD, No. A602,859, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was killed on the Nooksack River, Whatcom County, Washington, on December 5, 1928.

COMMON MALLARD, No. A602,864, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Kamloops, British Columbia, on September 18, 1929.

COMMON MALLARD, No. A602,869, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was recovered at a place 5 miles above Mission, Fraser River, British Columbia, on December 11, 1928.

COMMON MALLARD, No. A602,872, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was killed at a place 8 miles from where it was banded, on November 20, 1928.

COMMON MALLARD, No. A602,873, m., banded by R. M. Stewart, at McGillivray Creek

Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Sumas Prairie, British Columbia, during the week of November 19, 1928.

COMMON MALLARD, No. A602,874, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was found dead in the same locality in which it was banded on December 13, 1928.

COMMON MALLARD, No. A602,881. m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Pitt Meadows, British Columbia, on November 23, 1928.

COMMON MALLARD, No. A602,884, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Sumas Prairie, British Columbia, on November 17, 1928.

COMMON MALLARD, No. A602,890, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot on the Harrison River, British Columbia, on December 6, 1928.

COMMON MALLARD, No. A602,891, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Pitt Meadows, British Columbia, on December 17, 1928.

COMMON MALLARD, No. A602,892, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Glen Valley, British Columbia, on November 27, 1928.

COMMON MALLARD, No. A602,893, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was killed at Duncan, Vancouver Island, British Columbia, on January 27, 1929.

COMMON MALLARD, No. A602,895, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Sumas Prairie, British Columbia, on December 1, 1928.

COMMON MALLARD, No. A602,898, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Harrison Lake, British Columbia, on November 28, 1928.

COMMON MALLARD, No. A602,899, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Harrison Bay, British Columbia, on November 25, 1928.

COMMON MALLARD, No. A602,900, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at a place 15 miles from Vancouver, British Columbia, on December 29, 1928.

COMMON MALLARD, No. A602,901, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot on the Harrison River, British Columbia, on December 14, 1928.

COMMON MALLARD, No. A602,904, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was shot at Sumas Prairie, British Columbia, on December 1, 1928.

COMMON MALLARD, No. A602,905, f.' banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 17, 1928, was killed near Drayton Bay, Blaine, Washington, on November 18, 1928.

COMMON MALLARD, No. A602,909, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 18, 1928, was recovered at Sardis, British Columbia, on January 20, 1929.

COMMON MALLARD, No. A602,911 f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 18, 1928, was shot at Sumas Prairie, British Columbia, on November 25, 1928.

COMMON MALLARD, No. A602,914, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 18, 1928, was shot on the Harrison River, British Columbia, on November 30, 1928.

COMMON MALLARD, No. A619,307, banded by F. H. Rose, at Moiese, Montana, on November 18, 1928, was shot at a place 23 miles south of Grassy Lake, Alberta, on September 16, 1929.

COMMON MALLARD, No. A602,923, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Sumas Prairie, British Columbia, on December 6, 1928.

COMMON MALLARD, No. A602,924, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot on the Harrison River, British Columbia, on December 10, 1928.

COMMON MALLARD, No. A602,931, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Chilliwack, British Columbia, on December 2, 1928.

COMMON MALLARD, No. A602,933, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Hatzic Prairie, British Columbia, on December 9, 1928.

COMMON MALLARD, No. A602,938, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was killed at a place 5 miles from where it was banded, on November 20, 1928.

COMMON MALLARD, No. A602,941, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was killed at a place 5 miles from where it was banded, on November 20, 1928.

COMMON MALLARD, No. A602,945, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Dewdney, British Columbia, on December 5, 1928.

COMMON MALLARD, No. A602,961, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Sumas Prairie, British Columbia, on December 1, 1928.

COMMON MALLARD, No. A602,963, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Nicoamen Island, British Columbia, on December 8, 1928.

COMMON MALLARD, No. A602,965, f., banded by R. M. Stewart, at McGillivray Creek

Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot on the Harrison River, British Columbia, on December 10, 1928.

COMMON MALLARD, No. A602,970, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Dewdney, British Columbia, on December 2, 1928.

COMMON MALLARD, No. A602,979, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia on November 20, 1928, was shot at Nicoamen Slough, British Columbia, on December 16, 1928.

COMMON MALLARD, No. A602,990, f., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Lynden, Washington, on December 17, 1928.

COMMON MALLARD, No. A602,992, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Dewdney, British Columbia, on January 28, 1929.

COMMON MALLARD, No. A602,994, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Sumas Prairie, British Columbia, on December 14, 1928

COMMON MALLARD, No. A603,000, m., banded by R. M. Stewart, at McGillivray Creek Game Reserve, Chilliwack, British Columbia, on November 20, 1928, was shot at Sumas, British Columbia, on November 22, 1928.

COMMON MALLARD, No. A619,693, ad., m., banded by F. H. Rose, at Moiese, Montana, on November 20, 1928, was shot at Cassils, Alberta, during the month of October, 1929.

COMMON MALLARD, No. A619,744, banded by F. H. Rose, at Moiese, Montana, on November 22, 1928, was shot on Rat Creek, Wabiskaw River, 60 miles from Fort Vermilion, Peace River, Alberta, on May 10, 1929.

COMMON MALLARD, No. A619,821, banded by F. H. Rose, at Moiese, Montana, on November 22, 1928, was shot at a place 8 miles east of Stavely, Alberta, on October 29, 1929.

BLACK DUCK, No. A603,615, banded by W. Bruce Large, at Rochester, New York, on November 21, 1928, was shot at West Lake, near Wellington, Prince Edward County, Ontario, on October 10, 1929.

BLACK DUCK, No. A603,637, banded by W. Bruce Large, at Rochester, New York, on November 27, 1928, was shot at St. Michel des Saints, Berthier County, Quebec, during the month of May, 1929

BLACK DUCK, No. A603,645, banded by W. Bruce Large, at Rochester, New York, on November 27, 1928, was killed at St. Peter Lake, Quebec, on September 17, 1929.

AMERICAN PINTAIL, No. 600,757, banded by F. W. Robl, at Ellinwood, Kansas, on March 5, 1928, was killed at Ravenscrag, Saskatchewan, on April 27, 1930, when it flew against some telegraph wires.

RING-NECKED DUCK, No. 567,762, banded by C. O. Handley, at Beachton, Georgia, on January 30, 1928, was caught in a trap, at Upper Lake Abitibi, Ontario, on May 17, 1930.

CALIFORNIA GULL, No. 555,092, juv., banded by Frank L. Farley, at Gull Island, north end of Bittern Lake, 15 miles north west of Camrose, Alberta, on June 23, 1928, was found dead at Valier, Montana, during the spring of 1930.

CALIFORNIA GULL, No. 555,254, juv., banded by Frank L. Farley, at Gull Island, north end of Bittern Lake, 15 miles north west of Camrose, Alberta, on June 23, 1928, was killed by poison put out for gophers, in the same locality in which it was banded, on June 9, 1930.

CALIFORNIA GULL, No. 699,627, juv., banded by Frank L. Farley, at Gull Island, north end of Bittern Lake, 15 miles north west of Camrose, Alberta, on June 28, 1928, was caught on a fish hook, in the Napa River, Napa County, California, on March 12, 1930.

CALIFORNIA GULL, No. 699,829, juv., banded by Frank L. Farley, at Gull Island, north end of Bittern Lake, 15 miles north west of Camrose, Alberta, on June 28, 1928, was found after a storm in an exhausted condition, at Scapa, Alberta, on June 2, 1930.

CHIMNEY SWIFT, No. C27,313, banded by I. H. Johnston, at Charleston, West Virginia, on September 13, 1928, was recovered at Haliburton, Ontario, on May 24, 1930.

FLICKER, No. 287,798, juv., banded by George Lang, at Indian Head, Saskatchewan, on June 23, 1928, was caught at Cupar, Saskatchewan, on May 11, 1930.

STARLING, No. 628,834, banded by F. C. Lincoln, at Washington, D.C., on February 21, 1928, was shot at Elgin, Ontario, on June 14, 1930.

STARLING, No. 625,594, banded by E. S. Thomas, at Columbus, Ohio, on March 3, 1928, was killed at West Brome, Quebec, on May 14, 1930.

EASTERN PURPLE FINCH, No. 685,972, ad., m., banded by Robert Allison, at Athol, Massachusetts, on October 17, 1928, was killed at Renforth, New Brunswick, on May 1, 1929, when it flew against a window pane.

EASTERN FOX SPARROW, No. 426,634, banded by Horace D. McCann, at Paoli, Pennsylvania, on November 21, 1928, was found at Deer Lake, Newfoundland, on May 30, 1930.

LINCOLN'S SPARROW, No. B27,515, ad., banded by T. T. & E. B. McCabe, at Indianpoint Lake, Barkerville, British Columbia, on May 25, 1928, was shot at a place one mile from the banding station, on June 2, 1930.

ERRATA—September, 1931

Page 150, line 61, for "October 12" read October 31.

Page 150, line 64, for "jw" read juv.

Page 150, line 65, for "Country" read County.

Page 151, line 132, for "Chilliwrack" read Chilliwack.

Page 152, line 3, for "Chilliwrack" read Chilliwack.

Page 152, line 69, for "McGillirvay" read McGillivray.

Page 153, line 3, for "November 23" read November 28.

Page 153, line 4, for "Onatrio" read Ontario.

Page 153, line 34, for "Baldpatt" read Baldpate.

Page 153, line 91, for "Haudley" read Handley.

Page 153, line 130, for "615,535" read 615,435.

Page 154, line 67, for "Camorse" read Camrose.

Page 154, line 83, for "is" read it.

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NOTES ON THE MEARNS FLYING SQUIRREL

By A. F. COVENTRY
Department of Biology, University of Toronto

A VERY favourable opportunity of watching Flying Squirrels came to me this summer, and since some of the observations appear to amplify reports already published and others differ from current accounts, it seems worth while to give a short description of my experiences.

The observations were made in the Temagami Provincial Forest on an island about four and a half acres in extent, densely covered with bush except for a small clearing immediately round the cottage; birch predominated in the centre, conifers round the edge; the underbrush is largely moose maple and in some parts ground hemlock.

The Flying Squirrel of Temagami is *Glaucomys sabrinus macrotis* (Mearns); the average measurements of thirteen adult and subadult specimens are: total length, 264 mm.; tail vertebrae, 117.5 mm.; hind foot, 35.8 mm.; ear from notch, 21.1 mm. This places the limit of *G. s. macrotis* in Ontario further north than is shown on Howell's map. (North American Fauna No. 44. A. H. Howell. Revision of the American Flying Squirrels. 1918). In each of the last six summers there have been a few Flying Squirrels on the island, and during the past season there have been at least thirteen well-grown young and adults; by general report they were unusually numerous in the Temagami region this year. The sub-adults could generally be distinguished from the adults by their less pronouncedly cinnamon colour and by their "unformed" behaviour.

While a few of these animals had been seen at intervals during the earlier part of the summer, it was not till August 27 that they became conspicuous. From then till the middle of September they were observed almost nightly, and food was regularly placed for them on a low stump some six feet from one of the cottage doors.

The Flying Squirrels became active about half way between sundown and full dark, or a little earlier, and remained out till at least one o'clock in the morning, probably later; the younger animals seemed generally to come out rather before the old. Observations were easy to make, since for at least half an hour there was enough daylight, and after that they seemed quite undisturbed by the beam of a focussing electric torch.

The first arrivals almost always came by the same route, from a clump of fifty-foot birches behind the cottage by a glide of about sixty feet measured horizontally, to a small cedar tree about eight feet from the side door; they always landed about four feet from the ground on the branchless trunk. From this trunk it was about three feet to the food. Later arrivals often came by the same route, but just as often by the roof of the cottage, and very frequently along the ground. My observations do not agree with the statement that Flying Squirrels are found "apparently never running for any distance on the surface of the ground". I have, over several years, noted these animals spending a considerable portion of their active time on the ground foraging among the debris of the forest floor; I have, too, seen them carry food placed out for them along the ground till they were lost to sight in the underbrush, a distance of perhaps thirty or forty yards.

The food placed on the low stump was either the end crust of a loaf or a piece of bacon rind with some fat on it; either had to be wired down securely to prevent the first comer carrying off the whole supply. I have watched the Flying Squirrels feeding on the stump at a range of two feet both by waning daylight and by the light of an electric torch.

In general the older animals took precedence of the younger; an adult finding a young one already on the food stump chased it off by threatening to bite it; the dispossessed junior went only a short distance away, usually about three feet on the ground or a foot or two up the landing tree, and then watched for an opportunity to get back to the food; sometimes after a carefully furtive approach, it managed to snatch a few bites before being driven away again. On occasions, generally after the first hunger had been satisfied, two or three ate amicably from the

FIG. 1. *A characteristic attitude*

FIG. 2. *Adult at feeding stump*

FIG. 3. *Sub-adult feeding on ground*

same crust; the younger animals were more likely to do this than the older, and only rarely did young and old eat in close company.

After feeding for a short while at the stump, all the visitors, young and old alike, turned their attention to detaching large pieces of the food, and often showed some ingenuity in getting them clear of the wire; when they had succeeded they immediately carried them away into the bush, presumably to a cache, since recognisable individuals were back after a lapse of time too short to allow the consumption of the spoil. When carrying a very large piece of food they hopped, kangaroo-fashion, otherwise they went on all fours. Now and then fights took place over food, but they showed nothing like the violence of the battles of Red Squirrels under similar circumstances and they were always over in a few seconds. These fights were almost the only occasions on which the Flying Squirrels became vocal; while fighting they made curious, not very excited-sounding, clucking noises.

While one or more animals were interested in the food on the stump, others were almost always wandering about on the ground nearby or in the neighbouring trees, especially birches, on the trunks of which they seemed to find particularly attractive feeding, though I could not discover what the attraction was. These prowlers within a range of fifty or sixty feet could easily be picked up by the beam of an electric torch reflected from their eyes, though on the ground the numerous toads were a source of temporary error.

Sometimes the Red Squirrels were active after the Flying Squirrels had appeared, and at the feeding stump (to which the Red Squirrels also were accustomed to come regularly) the Flying Squirrels always gave way to the Red without any show of resistance, and retired to a much greater distance than when they yielded place to one of their own kind. This occurred even late in the evening, about ten o'clock, on the one occasion on which I saw a Red Squirrel active at so late an hour.

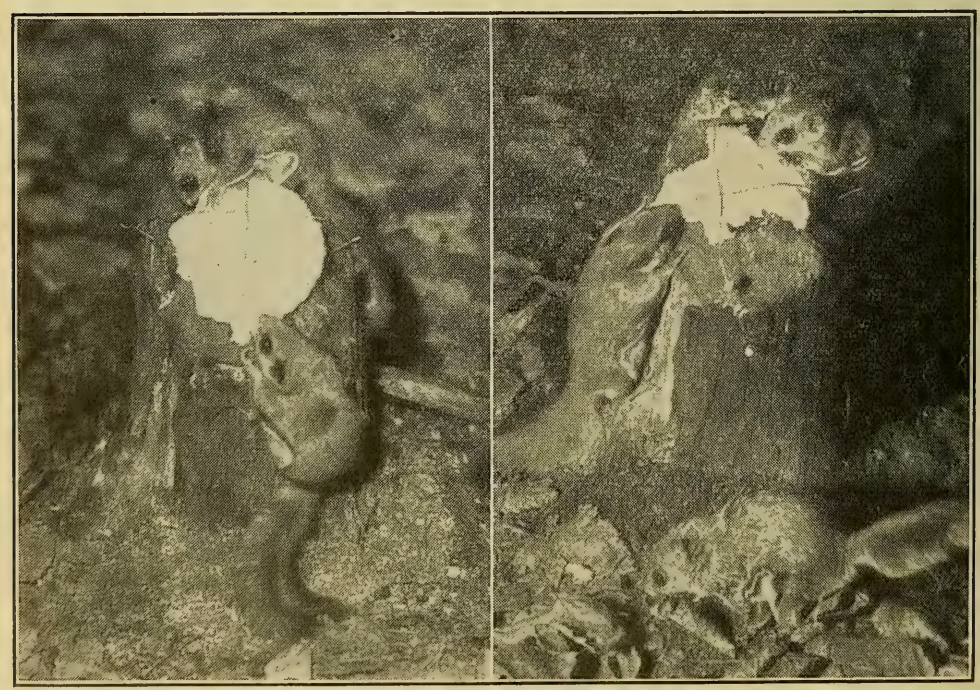
I have little to add to the published accounts of their "flight". I have on a number of occasions in twilight and by the light of a Coleman lantern after dark seen a clearly undulating glide, both from tree to tree and from tree to ground. A glide may take a continuously curved course; one that I saw started from a fifty-foot tree in a westerly direction and swung through a smooth semi-circle till the animal landed on the ground seventy or eighty feet away facing due east. The flattest glide seems to be about one in three. Short jumps of three or four feet on to the ground are practically a matter of pancaking down with the patagium outspread, the four feet making

contact simultaneously. The landing is much gentler than that of the Red Squirrel; I have had both species alight on me from comparable distances, and the difference of impact is very marked.

The extensive patagium seems to be no impediment to any sciurine movement, either on the ground or in trees; fragments of food are held by the fore feet for eating precisely in the Red Squirrel's manner.

It is worth calling attention to the indifference of the Flying Squirrel to strong light, an indifference hardly to be expected in an animal so markedly nocturnal. Individuals will, as has been noted by others, freely enter well-lit rooms through open doors or windows in search of food, neither the rather white light of a Coleman lantern nor the much yellower light of a coal-oil lamp seems to cause them the slightest inconvenience. It appears, it is true, as if they did not perceive food, such as a piece of biscuit, from a distance greater than about two feet, but I have no evidence that they do so at a greater ranger under more normal conditions. Even more striking is the absence of reaction to sudden illumination by the beam of an electric torch; only on a very few occasions have I seen feeding animals under such circumstances make any movement that could be interpreted as a reaction; for the most part they do not miss a single bite. I have, too, seen an animal alight accurately on a small twig in the full glare of the beam, the precision of its movements apparently not at all impaired by the abnormal environment. It is certainly curious that conditions that would give diurnal man, well-used to high intensities of illumination, considerable, if temporary, discomfort, should be without visible effect on a nocturnal animal possessing eyes enlarged for use in very feeble light.

The cuts which accompany these notes are from photographs chosen out of a series taken during the course of the observations. A quarter-plate camera with a Zeiss Tessar 21 cm. lens was arranged on a tripod in the doorway near the landing tree and feeding stump, and focussed with the aid of a beam from the electric torch. The stop was generally f/8, the plate Ilford Soft-gradation Panchromatic. The illumination was by photoflash bulb in a small reflector supported on the end of a batten so that it could be pushed out towards the subject. The only difficulty was the occasional desire of an animal to climb about the camera.



FIGURES 4 AND 5. *Groups of Sub-adults feeding together*

FIGURE 1. *Open cut at Henderson Talc Mine.*

*TALCUM AT MADOC, HASTINGS COUNTY, ONTARIO**

By M. E. WILSON

THERE are not many materials that are more generally used, or with which everyone is more familiar, than talcum yet probably few of those who use it know that talcum, or talc as it is known to mineralogists, is a mineral, or that the largest known single deposit of talc suitable for talcum powder in America occurs near the village of Madoc, in Hastings county, Ontario, and that all or nearly all talcum prepared in Canada is obtained from this deposit.

There are several occurrences of talc in the

* Published by permission of the Director, Geological Survey of Canada.

Madoc district but the principal mass, that on the Henderson and Connolly properties, has roughly the form of a huge east-west-trending spoon lying with its upper or concave side to the north. It is 1100 feet long in a straight line and 1300 feet long measured along its crenelations. It ranges from 5 to 65 feet wide and has been followed to a depth of 300 to 400 feet. The rock in which the talc occurs is dolomite but adjoining the deposit and crossing it in places is a zone (or dyke) of madocite, a rock consisting chiefly of brown tourmaline. About 1000 feet to the south of the deposit there is an extensive mass of granite which has thrust its way into the dolomite. It is probable, since talc is a magnesian silicate and dolomite contains magnesia, that at the time the granite mass was intruded, silica from the granite ascended along a fracture now occupied by the madocite and by a chemical reaction with the magnesia of the dolomite formed talc.

The talc is a soft white glistening flaky material that can be scratched with the finger nail. For use as talcum powder it is ground to a fine flour-like powder that will pass through a 200-mesh screen, that is, to a size that will permit over 177,000 of the ground particles of the talc to occupy an area of one square inch without overlapping. There are two mills for grinding the talc at Madoc, one that of the George H. Gillespie Company, which owns the Henderson mine (Figure I), at the Canadian National Railway station in Madoc village, and the other that of the Canada Talc Company Limited on the Connolly property. The total value of the talc, so far produced from this deposit, is about three and one quarter million dollars. The talc mines lie on the southeast outskirts of Madoc village and only half a mile south of the new Ottawa-Sarnia highway.

NEW SPECIES OF MOLLUSCA FROM THE ST. MARY RIVER FORMATION OF ALBERTA[1]

By LORIS S. RUSSELL

THE St. Mary River formation is developed in southwestern Alberta and adjacent Montana. It consists of alternating sandstones and shales, mostly of fresh-water deposition, and is Late Cretaceous in age. The remains of non-marine mollusks are widely distributed in the formation, and make up a characteristic fauna, the discussion of which is reserved for a forthcoming paper. The present contribution describes several new species in the collection of the Geological Survey of Canada. It is hoped that it will be possible, in a future systematic revision, to treat the taxonomy of these species more fully.

CLASS PELECYPODA

FAMILY SPHÆRIIDÆ

Sphærium mclearni, sp. nov.

Fig. 1

Type.—Geological Survey of Canada, No. 6791; impression of the interior of right ? valve, from St. Mary River beds on north side of Oldman ("Northfork") River, in section 11 or 12, township 10, range 2, west of 5th meridian; F. H. McLearn, 1914.

Description.—Shell of medium size for the genus, broadly ovoid in outline, approximately equilateral, rather convex. Beak situated at midlength, rather prominent. Dorsal margin nearly straight, subangular at each extremity; anterior and posterior margins truncated, a little obliquely; ventral margin broadly convex, most prominent behind midlength, and rounding upward at either extremity. Lateral teeth two in number in front and behind, delicate, compressed; cardinal teeth unknown. Surface apparently with fine lines of growth. Length of holotype, 8.6 mm.; height, 7.7 mm.

Remarks.—This species apparently is a true *Sphærium*. The prominent beak, abbreviated length, and rather tumid form of shell will serve to distinguish *S. mclearni* from other equilateral species with which it might be confused.

Sphærium livingstonensis, sp. nov.

Fig. 2

Type.—G.S.C. No. 6792; a right valve from St. Mary River beds on Oldman River, in section 11 or 12, township 10, range 2, west of 5th meridian, near Livingstone post office, Alberta; F. H. McLearn, 1914.

Description.—Shell moderately large, thin, very convex, elongate and inequilateral. Beak moderately prominent, situated at about one-quarter of shell-length from anterior extremity. Anterior

[1] Published with the permission of the Director, Geological Survey of Canada, Department of Mines, Ottawa.

dorsal margin sloping; anterior margin subtruncate or broadly rounded; ventral margin nearly straight in front, broadly rounded behind, most prominent well behind midlength; posterior margin well rounded; posterior dorsal margin straight. Dentition unknown. Surface marked with irregular, concentric growth lines. Length of holotype, 16.3 mm.; height, 9.2 mm.; thickness of complete shell, about 9.4 mm.

Remarks.—This species is well characterized by its elongate and inequilateral shape of shell, as well as by the strong convexity, which is not the result of crushing. Probably the species is not a true *Sphærium*, but may be referred to that genus tentatively.

Pisidium squamula, sp. nov.

Fig. 3

Type.—G.S.C. No. 6793; internal impression of left ? valve, from St. Mary River beds on north side of Oldman River, in section 11 or 12, township 10, range 2, west of 5th meridian; F. H. McLearn, 1914.

Description.—Shell small, suborbicular, inequilateral, very compressed. Beak not prominent, placed behind midlength. Dorsal margin short, sloping from beak; ventral margin most prominent in advance of midlength. Lateral teeth present, the posterior one a little more prominent; cardinal teeth obscure. Length of holotype, 4.3 mm.; height, 3.8 mm.

Remarks.—The extreme flatness of shell seen in this species is not characteristic of *Pisidium*, but the small size and peculiar outline are more suggestive of that genus than of any other of the Sphæriidæ.

CLASS GASTROPODA

FAMILY MELANIIDÆ

Goniobasis sanctamariensis, sp. nov.

Fig. 4

Goniobasis nebrascensis, Whiteaves, Geol. Surv. Canada, Contrib. Can. Pal., vol. 1, p. 21, pl. 3, figs. 4, 4a, 1885.

Type—The holotype is G.S.C. No. 6789, from the south bank of Oldman River, in the southeast quarter, section 3, township 10, range 24, west of 4th meridian. The paratype, figured by Whiteaves, is G.S.C. No. 5545, from St. Mary River in township 1, range 25, west of 4th meridian.

Description.—Shell of medium size, moderately elongate. Volutions five to six, well rounded rather prominent; suture impressed. Aperture ovoid, rounded in front, angulate behind. Surface marked by numerous fine, sinuous lines of growth, crossed by a great many extremely fine revolving striæ. Length of holotype, as preserved, 19.9 mm.; width, 10.0 mm.

Remarks.—This species is widespread in the St. Mary River formation of southwestern Alberta. It is sometimes associated with *G. whiteavesi*,[2] which I now regard as distinct from *G. tenuicarinata*. It is sometimes difficult to decide whether the protruding whorls of specimens are rounded enough for *G. sanctamariensis*, or truly angulate, as in *G. whiteavesi*.

Near the locality of the above-described Sphæriidæ there are present imperfect shells, probably of *G. sanctamariensis*. With these occur numerous opercula of the *Campeloma* type. This throws some doubt on the generic indentification here adopted; indeed, I have thought for some time that many of our Cretaceous and Tertiary species referred to *Goniobasis* may be slender viviparids. However, in the absence of definite evidence in support of this view, it is not advanced at this time.

[2] Russell, Roy. Soc. Canada, Trans., ser. 3, vol. 23, sec. 4, p. 83, pl. 1, figs. 7, 8, 1929.

FIG. 1 FIG. 2

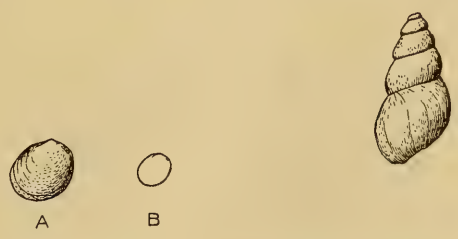


FIG. 3 FIG. 4 L. S. Russell

FIG. 1.—*Sphærium mclearni*, sp. nov., holotype. A, lateral view, x 2; B, outline, x 1.

FIG. 2.—*Sphærium livingstonensis*, sp. nov., lateral view of holotype, x 1.

FIG. 3.—*Pisidium squamula*, sp. nov., holotype. A, lateral view, x 2; B, outline, x 1.

FIG. 4.—*Goniobasis sanctamariensis*, sp. nov., dorsal view of holotype, x 1.

NOTES ON BOHEMIAN WAXWINGS (Bombycilla garrula pallidiceps)

By HARRISON F. LEWIS

THERE was a marked invasion of the valleys of the Ottawa and St. Lawrence Rivers by Bohemian Waxwings in the winter of 1930-1931.

At Ottawa, 4 individuals were seen in the Arboretum on December 21, 1930, by Dr. R. E. DeLury and party, while assisting in the taking of the Ottawa Field-Naturalists' Club's annual Christmas Bird Census. A flock of about 40 birds of this species was seen at the same place on January 1, 1931, by the writer. Dr. R. E. DeLury observed a flock (possibly two flocks) of about the same size in this vicinity on January 16 and also 3 individuals near the Dominion Observatory on February 11, 1931. Dr. DeLury also reports that, about the end of January, 1931, Mr. C. R. Westland saw a flock of about 200 Bohemian Waxwings on the grounds of the Central Experimental Farm.

At Montreal Mr. V. C. Wynne-Edwards saw 2 Bohemian Waxwings in Mount Royal Cemetery, where they were feeding on berries of a thorn bush (*Cratægus* sp.), on November 23, 1930. At the same place on November 29 he observed a flock of about 30 individuals. He reports that Mr. Winn, of the Redpath Museum, saw a flock of some 30 Bohemian Waxwings on the campus of McGill University, on December 4, 1930.

At Quebec flocks of Bohemian Waxwings of moderate size were seen from time to time during the winter of 1930-1931 by various competent observers, including Messrs. R. Meredith, G. Stuart Ahern, and L. A. Richard. They were noted there at least as early as January 11, while the latest observation at Quebec of which I have record was made on February 22, 1931.

At Trois Pistoles, Temiscouata County, Quebec, I saw a flock of about 45 Bohemian Waxwings on January 9, 1931. They were feeding on fruit produced by mountain ash trees that had been grown for ornamental purposes at many points in the village. There had apparently been a good crop of this fruit at this place in the previous autumn, but most of it had since been plucked by birds. I was told that much of it had been eaten by Canadian Pine Grosbeaks (*Pinicola enucleator leucura*) in the early part of the winter, but I saw none of this species during my visit on January 9. On that date the remaining fruit was being rapidly consumed by the Waxwings and about twenty Starlings (*Sturnus vulgaris vulgaris*) that were scattered through the village. Very little of the fruit remained on the trees and birds of both species were chiefly occupied in eating berries that, during earlier feasts, had fallen on the snow. They often ate together, but were not seen to interfere directly with each other. It was evident, however, that the available supply of mountain ash fruit in Trois Pistoles village would not last more than a few days at the rate of consumption that Waxwings and Starlings together were causing when I observed them.

Reports received from various observers in southern Ontario and Quebec, as a result of inquiries sent out, indicate that the southward movement of Bohemian Waxwings in eastern Canada in the winter of 1930-1931 did not proceed south of the valleys of the Ottawa and St. Lawrence Rivers in any appreciable volume.

It may be appropriate to include here an account of the feeding habits of Bohemian Waxwings as I observed them near Quebec City in the late winter and early spring of 1920 and recorded in my notes at that time.

On February 22 of that year I found a flock of about 120 Bohemian Waxwings feeding very actively in a straggling row of large thorn bushes (*Cratægus* sp.) that followed the line of separation of two open fields two or three miles west of Quebec. Three or four tall spruce trees were scattered along the row of thorn bushes. On the latter hung much frozen fruit, which was the food that the Waxwings were taking. I succeeded in reaching a position at the foot of one of the spruces without disturbing the birds much, and thereafter they would feed unconcernedly within two rods of me. At any given moment, part of the flock was in the spruce trees, part was in the bushes, and part was beneath the bushes, on the surface of snow three or four feet deep. There was ceaseless activity and birds were continually flying back and forth between trees, bushes and snow, uttering all the while their characteristic notes, one of which resembles the common note of the Cedar Waxwing (*Bombycilla cedrorum*), but is shriller and more metallic, while other notes, which are heard continuously from a large flock, form a twitter that reminds me of the twitter of a large flock of Juncos, contentedly feeding.

Some of the Bohemian Waxwings, perched in the bushes, plucked the fruits hanging there, and tried to swallow them, but eventually dropped most of such plucked fruits to the surface of the snow. Other individuals, situated on the snow, seized these fallen fruits, mouthed them over, and tried again to devour them. In all cases the

fruits eaten by the birds were swallowed whole, but they were so large and so hard that they were swallowed only with great difficulty. It seemed as if a bird made five or six unsuccessful attempts to swallow a fruit for every successful attempt. After failing in one or two essays to swallow a particular fruit a bird would drop it and try another, then perhaps discard that and try a third one, and so on. It was this habit that resulted in the dropping of many fruits by the birds in the bushes. Sometimes birds, with fruit in their mouths, flew up into the spruces to eat it. Eventually they all flew away in two compact flocks.

On March 13, 1920, after a terrific ice storm that encased every exposed surface with clear ice one-half inch or more in thickness, bowed down the bushes, and rent great trees asunder, I saw a flock of 40 Bohemian Waxwings hunting for food among the bushes on the face of Cape Diamond, in the city of Quebec, just below the walls of the citadel. They perched sometimes on the bushes, sometimes on the snow, and moved restlessly along, apparently obtaining nothing edible.

On April 5, 1920, a flock of 45 Bohemian Waxwings was seen near Quebec, feeding on the fruit of *Cratægus* bushes in a way similar to that noted on February 22. On this later occasion, however, several of the flock were seen to fly down into a shallow little stream and to drink from it, quickly and rather nervously, lifting the head between successive mouthfuls. They were not shy and were readily observed at close range for some time.

On April 9, 1920, a flock of 50 Bohemian Waxwings was found in the bare tops of the trees in a piece of deciduous woodland near Quebec They moved about by short individual flights from branch to branch or from tree to tree and were scattered over a considerable area. They examined the twigs and small branches and appeared to be picking some minute edible objects from them. As at other times, their notes formed a continuous stream of sound, each bird repeating some note at short intervals.

On April 11, 1920, 3 or 4 Bohemian Waxwings were seen catching flying insects about 1.00 p.m. They had taken up conspicuous perches on bare tree tops and were darting out after their prey from time to time and then returning to their perches, in the manner commonly exhibited by members of the Tyrannidæ.

My last observation of Bohemian Waxwings near Quebec in the spring of 1920 was made on April 12, when a flock of 35 was seen.

CONTRIBUTIONS TO THE KNOWLEDGE OF EXTREME NORTH-EASTERN LABRADOR

By BERNHARD HANTZSCH

TRANSLATED BY M. B. A. ANDERSON

"Beiträge zur Kenntnis des nordöstlichsten Labradors," von Bernhard Hantzsch, *Mitteilungen des Vereins für Erdkunde zu Dresden.* Dresden, Volume 8, 1909, pp. 158-229. Volume 9, 1909, pp. 245-320.

(Translated from the original German text in the Library of Congress, Washington, D.C., by M. B. A. Anderson, M.A., Ottawa, 1928.)

Original pagination given in the text.

During the severe months of winter all the families live in snowhouses; those who do not own a house settle down as parasites with others—as the missionary, Mr. Waldmann, told me of twenty-eight persons living together, for example, in a building, which consisted of one room and an entrance room. These remarkable buildings, well known to all Eskimo districts, are erected from quadrangular snow blocks of perhaps forty centimeters length and fifteen centimeters thickness, which are cut from well-frozen places with long, broad snow knives and are placed in layers in a helical-shaped wall. Usually they are supplied with a tunnel-shaped entrance-way, occasionally with adjoining rooms for dogs and tools, and when the house is to be used for any length of time, with a chimney and a gut window. Such beehive houses, which if small in size can be built by two skilled persons inside half an hour, are used by the white people on sled journeys. They afford excellent protection against the inclement weather, are easily heated and whenever they have become untidy and dirty, are replaced by others. Now and then they are lined with skins in order to protect the interior from the dripping of water. On the whole the snow houses, like the simple sod-houses, are built quite as the tents are built. It must be a charming sight, when the hemispherical building on a dark winter's night reflects the rays of the dimly shining lights.

Life in tent and snow house grants the population the possiblitiy of changing place of abode easily, and of seeking the most favourable districts according to the seasons. Only in late summer, when the mission ship is expected, the people are obliged to stay near the station, whenever it is at all possible, in order to aid with the discharging and loading. Other ships, such as the Canadian Customs and Police steamer *Arctic*, come to this harbour only occasionally for a short time, without being in need of the help of the natives.

[P. 276]. Often they have to wait many weeks for the mission ship, but there is always something to do in the meantime. Besides working for the station, for which the men are paid about forty cents a day, the women about twenty cents a day, they spend their time repairing sleds, boats and nets, collecting driftwood for the winter, or in fishing and hunting trips. In family groups or by twos and threes they start off in wooden boats to catch the codfish, which visits the inlets at Killinek in the autumn often in great numbers. Or they journey in the narrow skin boat, suitable for one man only, the kayak, to hunt seals and birds when they almost always use the gun. Young people almost always have old, poor muzzle-loaders; the skilled hunters acquire as soon as possible good magazine-rifles. In trips overland they always carry the gun without a strap, the stock over the shoulder, and hold the front part of the barrel with the hand, quite a convenient but a dangerous way to carry it. The marksmanship of these Eskimos, according to my observations, is not better than that of the average shot here at home; indeed I observed men who possessed very little accuracy in shooting. They usually approach the game much nearer than we consider necessary and delay often quite a long time with the shot. My companion Paksau had the reputation generally of being one of their best shots. From an unsteady boat I almost always had the lead over him; in our shooting experiences on the land however he proved to be an expert in no way at all. They scarcely use the so-called bird darts at all now; skill in the use of the harpoon with the line and float fastened to it seems to be declining likewise. I repeatedly met kayak hunters without these weapons on their hunting trips. The Labrador Eskimo in this respect is not at all equal to the Greenlander, a circumstance to be regretted, since, because of the almost exclusive use of guns, the game is becoming more shy and in consequence a large percentage is only wounded by shooting and is lost. Just as little can the Labrador Eskimo compare with the Greenlander in kayak journeys. Whenever the weather is not quite calm, he does not dare go out on the sea in his skin boat with the double paddle, which is somewhat clumsy [P. 277] and prefers to ride a wooden boat together with others. The missionary in Hebron, Mr. Bohlman, who before his Labrador residence worked in Greenland for many years, made the remark that the Labrador Eskimos stop their kayak journeys when the

Greenlanders feel right in their element. Everyone who knows this conveyance, which is quick, almost noiseless, making little demand on the strength of the paddler and therefore most suitable for hunting, will regret this deterioration. The old fashioned women's boats, which are built, as are the kayaks, from wooden ribs and covered with thick seal skin, but are open and very deep inside, are disappearing rapidly. I only saw one still in Killinek, that belonged to the people who had come from the south of Ungava Bay. The wooden boats are obtained quite cheaply at the southern Labrador stations from Newfoundland fishermen; from there they are transported into this neighbourhood.

When at last the mission ship does come, then all adult persons become workers. There is much carrying and hauling, rowing and loading under the direction of the missionaries, as long as light and weather permit. After three or four days or even after eight or ten days, all is ready. The ship departs, and now everyone may go where he wishes; caribou hunting towards the south, or hunting for ptarmigan or other birds nearby.

They refrain from very long journeys as a rule, for soon the profitable autumn seal-hunting with nets will come, in which almost all take part and which I have already described. At last it becomes winter, inlets and lakes freeze, the snow covers valleys and slopes protected from the wind. The low wooden sleds, several meters long, are put in order, the dogs are hitched in front of them and the hunt begins. Beforehand, they fetch the driftwood which has been piled up, or they journey occasionally to George River, Aulatsivik and other neighbouring settlements. Once in each winter a mail comes by dog sled from Fort Chimo in the south of Ungava Bay across George River to Killinek, and from here must be forwarded to Rama; after the official removal of this station in 1908, even as far as Hebron. The letters reach southern Labrador from station to station, and from here go out [P. 278] to Newfoundland and Europe. Later the post turns back by way of Killinek to George River. Some families in the winter travel to good fox-hunting places. At Christmas though, whenever possible at all, they all return to the station, in order to celebrate the festival with the other inhabitants of the vicinity both in a spiritual and a secular manner. That is the high point in the community life of these little people, so far removed from the world, for which even the heathen of Aulatsavik like to journey up to Killinek. During the winter time the missionaries collect the communicants about them every day, the children in the morning, the adults in the afternoon or evening, in order to teach them reading and writing along with Christian instruction, the singing of Christian songs, and so on.

When the sun rises higher again and the first signs of spring appear, then the old desire for wandering awakes anew in these little people. They simply throw away everything they can spare at all, which they have collected during the winter and often bought dearly, or leave it behind anywhere to fetch it later when needed, and vanish toward the hereditary spring hunting places. Here the life of the people may unfold in its most genuine way, not held down by foreign and spiritual bonds, by work in the mission and trade service, far from the civilization of the white people, in the midst of spring, awaking about them with its enchantment. The men then like to go hunting, across the land when two or three families travel together, on their feet often the broad Canadian snowshoes, or they go out with the dog sleds, in order to arrive more quickly and be able to transport the game better. They set traps for foxes and other fur-bearing animals, hunt for seals on the ice, walrus and bears, or, whenever open water forms later, journey in the kayak or wooden boat to hunt and catch trout. After they have returned home the women skin and eviscerate the seals. The hunter himself assumes the task of skinning and preparing the smaller fur-bearing animals, especially the foxes. At other times the men put their hunting gear in order, repair boats, kayaks and [P. 279] sleds, make nets, dog harness or even household implements and such things. There is always something for the industrious Eskimo to do, whenever inclement weather does not keep him for days in his room, when he works vigorously at sleeping, idling, eating, smoking and other less strenuous occupations. In general, as with us, the view is held that industry is praiseworthy, laziness is blameworthy. The time is not long for the women either, and industry and cleverness are held with them as worthy characteristics. They look after the children, keep house and tent in order, clean and tan the larger skins, sew or repair pieces of clothing, care for the oil lamps and other household utensils and prepare the simple meals, which to be sure are eaten at no definite hour of the day, but in most plentiful amounts in the evening.

As food, the animal products stand first, and are often eaten quite raw—from which it is said the name Eskimo from the Indian term Eskimantsik = raw flesh eaters—especially when it is a case of good fresh wild game. They even put raw pieces of meat into the hands of little children. I saw, a woman skinning seals, cut out the eyeballs, and hand these over to her children to suck, among whom was a child hardly a year

old. They like especially to eat the liver and kidneys raw. They prize as delicacies the contents of the walrus and caribou stomach, the blood of many animals is relished fresh or cooked; also the entrails of many birds, especially the ptarmigan, they eat raw and prefer them when they are still warm. Yet at the present time many upward-striving spirits feel uneasy in doing these things before the eyes of white people. This should not have been taught them. Now they throw away many quite good pieces, which the white people, accustomed as they are to different fare, may not like, because in their foolishness and ignorance they observe, that that which is not good enough for the "Kabluna", the "Innuit" likewise does not need to eat. When they have enough seal oil for the lamp or driftwood for the fireplace, they quite frequently cook the meat. They lay flat pieces in the kettles or pots and roast them, usually not longer than a quarter or half an hour. [P. 280] The meat therefore remains quite raw inside. Then they put the pieces in large wooden dishes, made by themselves, or throw them into any corner of the tent. They remain sometimes for many days, become bad-smelling and get a highly repulsive appearance. But apparently they like to eat them in that state. Cleanliness is little prized in the preparation of food. Occasionally they dry pieces of meat in the air, for protection, hanging them up on high pole contrivances or concealing them under stones from the dogs and beasts of prey. In the winter they freeze the meat. At the present time, through trade, countless foreign food stuffs, especially vegetable products, are being introduced and are eaten especially when they stay near the station. As the most important of these products the hard bread, biscuit, Eskimo *Kakkojak* may be mentioned, which attains great importance on account of its cheapness and lasting qualities in less favourable hunting times. Flour, rice, legumes, etc., can likewise be bought in the mission trade; but their use is seldom understood. Molasses or syrup is a favourite dainty for bread; sugar, likewise, an important article of trade. As a rule all Eskimos are great friends of sweet things but such things are not brought in or only in quite small quantities. At the southern stations the foreign fishermen make use of these well known preferences of the population for advantageous trade transactions. It is really to be deplored that other quite artificial products, such as condensed milk, butter and other preserves, find good buyers among the Killinek people. Water or a poor variety of Chinese tea is used as a drink, but coffee, as in many other Eskimo lands, not at all. Often the infusion tasted so disagreeable, that I for my part preferred to drink hot water; sugar and occasionally condensed milk are added to the tea. Fortunately alcoholic drinks are unknown, thanks to the precautions of the government, which imposes severe punishment for the sale.[33] Up to the present time [P. 281] our natives have not attempted to manufacture intoxicating drinks for themselves from syrup, hard bread and other materials, as this custom has become a vice several times at the southern stations. The striving for European kinds of food is continually making itself felt; perhaps a means to make the European trade profitable, but at the same time a means to ruin the people. In place of spirits the less harmful pleasure of tobacco is suffered, which is imported in a heavy variety, pressed into rectangular slabs. On the part of the traveller these tobacco slabs are the favourite gift to repay small services from the Eskimos; the price is five cents a piece. A small piece is cut off with the knife, this is collected in the hand, rubbed into bits and stuffed into a simple little pipe. Both sexes pay homage to the pleasure of smoking, men and old women mostly quite devotedly. They suffer hunger rather than give up their tobacco. In the evening the pipe is the last thing; at morning, the first. If you start on a trip, along with provisions the tobacco is considered the most important article you take with you. If you have used it up, it seems time to return to the station at least for a while to fetch a new supply. The frequent expectoration must be mentioned as the worst consequence of so much smoking. The people continue this habit, of course, in their confined winter dwellings, and, quite aside from uncleanliness, suffer a dangerous increase in the spread of illnesses. Several missionaries of the Labrador coast who think seriously about these matters. especially on these grounds wish the entire prohibition of the smoking of tobacco. Children and unmarried maidens I never saw smoking, and only rarely half-grown boys. If you are in the family circle, the wife usually fills the pipe, lights it, smokes it until it is well lighted, and then hands it over to her husband for his further use.

[P. 282] The longer the Eskimos are away from the station, the more simple and natural their way of living appears to be. But at times a serious lack of food occurs, that is induced less by their superstitious neglect or restriction of hunting, as is often the case with Eskimos living

[33] Chapter 130 of the Consolidated Statutes, section 51, reads:—No intoxicating liquors shall be sold, given, or delivered to any Esquimaux Indian, under a penalty of two hundred dollars. And section 52:—Any Stipendiary Magistrate anywhere, or any Justice of the Peace upon the coast of Labrador, shall have cognizance of any offence under this chapter (Report of an official visit, 1906, p. 25).

in isolated places, than by their thoughtless way of living and fatalistic extravagance. Unfortunately these peculiarities in the character of the Eskimos are strengthened by the activity of the trading stations, the representatives of which are in no way seriously concerned in inducing the population to change their harmful thoughtlessness. If the natives were thrifty and careful, collected their tools, gave away nothing, if they were not obliged to work doubly hard at hunting and fishing, the stations would do less business both in purchase and sale, and the directors of the stations would certainly acquire a reputation for incompetence with the management of the trading company. It is more than doubtful, that they grant belief and support to their arguments. Enough, if the Eskimos are removed far from the station, where they formerly were accustomed to receiving supplies even on credit, and get the most necessary food supplies, then severe famine now and then overtakes them, especially when the ammunition becomes scarce or gives out entirely, or they break their guns or bad weather sets in for a long time. I have heard terrible descriptions of these things in Killinek, and do not speak merely from the literature about it. If the weather permits them to go out at all, the men roam about in vain: the land game and birds have hidden themselves, no seal shows itself on the coast, and in the storm a kayak journey is not to be considered. They endure patiently one day without any food at all, the men come home exhausted the second evening, perhaps without game again. Of what use is it for the families if they bring only a couple of small birds, to which the women may perhaps add some tiny trout, which they have caught with much trouble in the brook! Even the Eskimo nature weakens after several days without food. The mothers are not able to quiet their infants, and one or two of the children die. [P. 283] The adults put up with anything they find, even marine plants and carrion. Thus they starve, until the weather improves, and a lucky catch relieves their plight. Soon they have quite forgotten their need and enjoy life again. Indeed it also occurs that starvation rises to its greatest heights and men, tenacious of life, who fight against death with all their strength, reach a state of madness. The cold and the peculiar way of living in those regions seem in themselves to exert a strong influence on the mental proceeses, as many examples in members of Arctic expeditions testify, but have been known also of Eskimos. (Compare Knud Rasmussen, *Neue Menschen*, Bern, 1907, p. 114.) These diseased conditions are certainly intensified by hunger. Then the man, no longer in control of his senses, falls upon the dead and weakened ones, in order to quiet his hunger with their flesh—he is accustomed, you see, to the raw flesh of animals anyway. So I explain to myself the occurrence of cannibalism reported now and then even from these districts, from my observations among Eskimos and according to my understanding of their character. And even if the people concerned were not mentally abnormal, temporarily or permanently, you could not suppress a sort of surprise, how this hardy people in continual contest for existence has accustomed itself, not to lose the striving for self-preservation in their most difficult conditions of life, and to struggle along to the utmost. Certainly in the majority of cases there is a mental difference between the cannibalism of the Arctic and that of the tropics. Now and then in spite of this whole Eskimo settlements perish from hunger, which occurs even at the present time.

Even if hard times occasionally come to the people, their life brings them many days of happiness, especially in the circle of the family and the members of the band. Deep sorrow and care, such as pursue us civilized beings, remain far removed from them. From birth to death their existence moves along in a great unpretentiousness and freedom, and their optimistic temperament causes them to bear all unpleasant happenings with confiding equanimity. [P. 284] Let us cast a glance at their family and community life, in so far as I succeeded in obtaining a knowledge of it. At the present time there is no special ceremony following the birth of the child. They are at the present day in a sort of transition stage: the old customs are being cast aside, because they continually hear that the heathen customs and views of life are false and blameworthy; the new is not yet understood and accepted. There is no special privacy at the time of the birth of a child as a rule. The people know one another too intimately, and physical occurrences are nothing unknown even to the children. As a consequence, even the smaller girls are often shy and reserved towards persons of the other sex, very seldom importunate and I observed clearly enough how the children observed in me less the human being than the man. If it is possible without difficulty, uncalled for persons are sent into a neighbouring tent; strict isolation of the woman in labour is not considered necessary. If an older woman is in the vicinity she comes to assist at the birth, loosening of the navel cord, etc. There is no mid-wife, however, even if some experienced old women are considered more dependable assistants than others. The

birth is said as a rule to take place quickly and easily. Yet difficult cases occur, in which a brutal massage is employed, combined with movements of the limbs, which have as a consequence often, severe illnesses and dislocations. Twice limping women were pointed out to me at stations farther south, who are said to have come by their infirmity in this manner. Miscarriages seem to be induced not too infrequently by forcible actions, premature births occur likewise as a consequence of physical exertions, which the pregnant women often undergo. Whether there occurs at this time the killing of newborn children, at least the weak or deformed children, I could not find out for certain. This old Eskimo custom may be exercised occasionally in hard times and on journeys. If the mother dies they take no pains to keep life in the newborn infant. [P. 285].

The influence of the missionaries is making itself felt at the present time in the care of infants, especially in respect to baths. Some women are said, as was told me on good authority, to protest against the introduction of these innovations preferring to lick the child from head to foot after a successful birth, during the first days to carry it continually at the breast, later to place it in the hood, and consider every use of water as harmful. There was a small, somewhat animal-looking Eskimo woman in Killinek, who quite represented the old times in her fur breeches and her dirt, otherwise an industrious, good-natured and clever person who, according to the report of the missionaries, had refused for months to wash her last offspring after it had been licked off. Her two or three older children were healthy and alive and the use of water might bring on a cold and death of the youngest, an argument, which is not to be rejected without further proof. Secretly one day a woman appointed in the mission service undertook to bathe the infant, whereupon the surprised mother is said to have been terrified.

The naming of the child follows not long after its birth. As far as I could learn, the child receives the name of the person among the relatives who died last; apparently it was believed that the soul of the dead would not find peace until then or perhaps even pass into the child and to a certain extent continue to live in him. There is said to be no very great difference between masculine and feminine names. If a near relative or an especially virtuous and well-beloved person in the community dies, then his name is often given to one or several children. Moreover to youths as well as adults occasionally also an appellation, chosen independently, is given, which denotes some outstanding peculiarity. They use the older and newer names interchangeably, so that often many children do not know what their names are, and it is difficult for the missionaries to find out this at the registering of new members, or to learn their right names. At Christian baptism the heathen persons taken into the Moravian church [P. 286] receive a new name, usually a biblical one; the Christians at the older mission stations have Christian names and surnames, of which the last is little used. The women recover quickly after a normal childbirth; it was said, they often take up their household duties on the same day. Washing the mother seems to be the rule. She almost always carries the newborn child in its first months herself; at night she lays it close beside her. As soon as it begins to cry loudly, the breast is offered to it, very often with the smaller children, at times every half hour, gradually less frequently with the larger ones, but then all the more abundantly. I did not observe any sort of scolding or severity at the frequent crying of the child; it was quieted in the natural way. If it was in the hood, the mother bent somewhat sideways, the child slipped out, often with its head down low, was picked up and held in the arms. The hood of course has to be cleaned now and then. Whenever the missionaries conduct services on Sunday, the children begin very soon to mingle their voices in the song of the congregation. For this reason after a short time all the younger women are holding their infants at their breasts. The nursing period is a long one. If another child does not take the place for itself, it lasts at least 1½ years, occasionally still longer. When five- or six-year-old children come to their mother's breast this happens only from good-natured indulgence on their part. There certainly is no longer any necessity for it. It is noteworthy that younger women are said to have milk almost all the time, even years after a birth. For this reason they occasionally quiet strange children. I saw myself, how an elderly grandmother took her grandchild to her breast, but this perhaps served only to quiet it. This ability to nourish children even for years, is not only of the greatest importance in general for a strong development of the children, but in this district especially important, because here meat follows at once as the food after the mother's milk, to chew which well-developed teeth are necessary. Different mothers showed me [P. 287] with pride the strong and sound teeth of their infants; although I do not believe that teething takes places noticeably sooner than with us. The fat little rascals learn to run about at the age of a year or so, but space forbids me to communicate my observations about children of this age. The mortality of

infants is relatively slight in normal times; frequently three, four, even more children grow up. As Governor W. MacGregor mentions, he became acquainted with a woman in Killinek in 1905 who had had nine children in two marriages. (Report, 1906, p. 15.) Conditions are more unfavourable farther south, as I heard particularly of Hopedale. At this place, probably because of their way of life being changed, only a part of the women are capable of nursing their infants for any length of time. This is doubly bad, because there are no domestic animals which give milk. They often use condensed milk, mix it, at one time with much water, the next time with little; make the drink hot one time, cool at another time, and so it is no wonder that many children die, even the whole population is degenerating.

The mothers show self-sacrificing care for their children. But their love makes a somewhat animal-like impression on me. If the child dies, then her sorrow is no great and lasting one. They comfort themselves apparently with the thought that the child was not strong enough to satisfy the great demands which this unhospitable country makes on its inhabitants. They cannot make use of weaklings up there, who are a burden to themselves and to others; hard nature demands hard people. Many times in the morning you see children running about in front of the tent undressed or only scantily clad. The father doesn't trouble himself actively about his offspring, until they begin to grow up. He takes him along with him hunting and fishing, makes use of him in all kinds of tasks, but teaches him more through example than through precept. The girls stay with their mother and watch her at all feminine forms of work, naturally also at the care of some younger brothers and sisters, until they can lend a hand themselves [P. 288] and at last, according to their cleverness, earlier or later do like the mother in everything. You observe any special tenderness of the parents for their children just as rarely as great harshness. The children though, with all the freedom which they have, are almost always obedient, ready to help, and respectful. Exceptions, which occurred even in my time, are generally punished. With one another the children also appear friendly, even if as a rule quieter and less active than our children. The girls are quite gentle, polite and quiet, so that you enjoy being among them. The activities and games of the children consist on the whole in helping the adults or independent preparations and attempts at their future occupations as men and women. As far as their strength permits, they make themselves very useful, even indispensable. For this reason childless pairs like to adopt a strange child. I do not believe it is the case with the Killinek people, that girls are prized considerably less than boys, as is said to be the case with certain Eskimo bands.

(*To be continued*)

AN ANNOTATED LIST OF VASCULAR PLANTS COLLECTED ON THE NORTH SHORE OF THE GULF OF ST. LAWRENCE, 1927-1930

By HARRISON F. LEWIS

(*Concluded from page* 66)

COMPOSITÆ

Solidago hispida Muhl., var. *tonsa* Fernald.

Ste. Genevieve Island, August 23, 1928, top of limestone shingle beach. Recorded by St. John as *Solidago hispida* Muhl.

Solidago macrophylla Pursh.

Yankee Harbour, July 28, 1927, shallow ravine. Little Rigolet, August 29, 1927, damp woodland border on Mauger Island.

**Solidago uniligulata* (DC.) Porter.

Natashquan, August 7, 1927, fresh marsh beside Little Natashquan River.

Solidago humilis Pursh.

Betchewun, August 26, 1928, border of woods.

**Solidago rugosa* Mill.

Seven Islands, September 12, 1928, border of thicket on raised boulder beach on Manowin Island. Magpie, September 1, 1928, border of hay-field.

Solidago rugosa Mill., var. *villosa* (Pursh) Fernald.

Kegaska River, August 15, 1928, rank vegetation above sand beach at mouth of brook near mouth of river. Harrington Harbour, July 25, 1928, damp ground on rocky point of shore of mainland. Reported by St. John from "Rivière au Tonnerre" only. Range extension, 242 miles E.

Solidago graminifolia (L.) Salisb.

Mingan, August 30, 1928, sand-flat beside Mingan River.

**Aster radula* Ait.

Mascanin, August 20, 1928, wet muskeg. Recorded by S. R. Butler from Bonne Esperance or vicinity, but relegated by St. John to hypothetical status, as being "probably of the var. *strictus*".

Aster radula Ait., var. *strictus* (Pursh) Gray.
Thunder River, September 2, 1928, slight hollow in tundra. Aylmer Sound, August 18, 1927, dry, sandy plain on west side of Little Mecatina Island.

**Aster Lindleyanus* T.& G.
Betchewun, August 25, 1928, open hillside.

Aster foliaceus Lindl.
Mingan, August 30, 1928, sandy border of Mingan River. Betchewun, August 25, 1928, limestone shingle at top of beach on Gun Island. Natashquan, August 5, 1927, damp pond margin and September 10, 1927, gravel near shore. Kegaska, August 14, 1928, fringing vegetation near shore of Green Island. Romaine, August 11, 1928, foot of sandy bank at top of beach. Fog Island, August 2, 1927, turfy slope. St. Augustin, August 20, 1927, east end of Little Rigolet Island.

**Aster foliaceus* Lindl., var. *frondeus* Gray.
Lake Island, August 14, 1927, shallow turf at top of sea-cliff.

**Aster foliaceus* Lindl., var. *arcuans* Fernald.
Natashquan, August 9, 1927, border of cultivated field.

**Aster puniceus* L.
Eskimo Island (Mingan Islands), August 28, 1928, four feet high on sunny bank. Harrington Harbour, July 25, 1928, wet thicket on sand beside shore of mainland.

Aster puniceus L., var. *oligocephalus* Fernald.
Kegaska River, August 15, 1928, foot of sand bank at top of sand beach near mouth of river. Bradore Bay, August 27, 1927, damp, grassy slope. Recorded by St. John from "Ile Gros-Mécatina" only. Range extension, 123 miles W. and 83 miles E.

Aster nemoralis Ait.
Natashquan, August 7, 1927, low, rocky point.

**Erigeron lonchophyllum* Hook., var. *laurentianum* Vict.
Ste. Genevieve Island, August 23, 1928, crevices in flat limestone near shore. Recorded and described from the Mingan region, including Ste. Genevieve Island, by Frère Marie-Victorin (1926).

Anaphalis margaritacea (L.) Benth. & Hook.
Betchewun, August 25, 1928, open hillside. Recorded by St. John as *Anaphalis margaritacea* (L.) Benth. & Hook., var. *subalpina* Gray.

**Anaphalis margaritacea* (L.) Benth. & Hook., f. *anochlora* Fernald.
Seven Islands, September 12, 1928, steep declivity of raised boulder beach on Manowin Island. Mingan, August 30, 1928, sand bank beside the Little Manitou River.

GNAPHALIUM ULIGINOSUM L.
Natashquan, September 8, 1927, damp sand near pond, and August 18, 1928, hollow in sand dunes.

*AMBROSIA ARTEMISIIFOLIA L.
Matamek River, September 5, 1928, dooryard near mouth of river.

*AMBROSIA PSILOSTACHYA DC.
Harrington Harbour, September 1, 1927, rubbish heap. See Groh (1929).

ACHILLEA MILLEFOLIUM L.
La Tabatière, July 21, 1928, rocks in dooryard. Reported by St. John from Mingan only. Range extension, 242 miles E.

Achillea Millefolium L., var. *nigrescens* E. Mey.
Island in Fog Island Bird Sanctuary, August 1, 1927, crevices in rock. Lake Island, July 18, 1927, rocky top of cliff. Whale Head, July 10, 1927, turfy dooryard near Jas. Mauger's harbour. Bradore Bay, July 13, 1928, grassy, sandy upper beach. The collection from an island in Fog Island Bird Sanctuary has pink rays.

**Achillea Millefolium* L., var. *lanulosa* (Nutt.) Piper.
Fog Island, August 9, 1928, shallow, higher turf.

*MATRICARIA INODORA L.
Matamek River, September 5, 1928, dooryard near mouth of river.

*CHRYSANTHEMUM LEUCANTHEMUM L., var. PINNATIFIDUM Lecoq & Lamotte.
Natashquan, August 5, 1927, track in sand dunes. Observed also at Seven Islands, Betchewun, and La Tabatière.

TANACETUM VULGARE L.
Wolf Bay, September 2, 1927, shallow soil near houses. Not recorded by St. John east of "Betchouane". Range extension, 133 miles E.

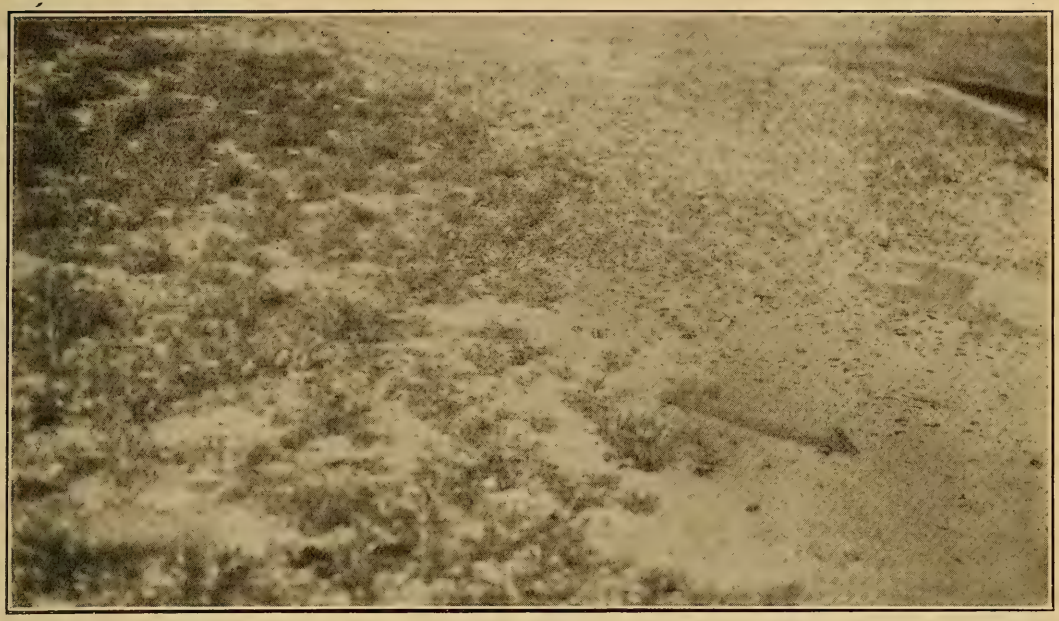
Artemisia canadensis Michx.
Mingan, August 30, 1928, sand flat beside Mingan River.

*ARTEMISIA BIENNIS Willd.
Matamek River, September 5, 1928, dooryard near mouth of river. Natashquan, August 19, 1928, dried-up pond bed in village.

Petasites palmata (Ait.) Gray.
Betchewun, June 5, 1927, shallow soil on limestone in open near shore.

SENECIO VULGARIS L.
Kegaska, August 12, 1927, soil on rocks by shore, enriched with fish refuse.

Senecio palustris (L.) Hook.
Cormorant Rocks, July 17, 1927, wet ground on island. Wapitagun, July 14, 1927, cleft in rock on Matchiatik Island. Mecatina Bird Sanctuary, July 23, 1928, damp hollow near shore on an outer island.



Formation of calcareous soil from shells of common mussel, *Mytilus edulis*, on Green Island, near Kegaska.

View along top of beach, showing finely broken shell in foreground, a recent accumulation of shells, many of which are still unbroken, in the middle distance, and small areas of exposure of the granitic country rock at the right. *Senecio Pseudo-Arnica* is invading the raw heaps of shell.

Senecio pauciflorus Pursh.

Ile au Bois, July 7, 1930, damp, mossy depression on hillside.

Senecio aureus L.

Betchewun, August 25, 1928, dry hillside.

Senecio pauperculus Michx.

Betchewun, September 3, 1929, rocky limestone shore. Blanc Sablon, July 20, 1929, wet place on hillside west of falls of Blanc Sablon River (this collection made by E. C. Abbe).

Senecio Pseudo-Arnica Less.

Yankee Harbour, July 28, 1927, top of beach. Lourdes de Blanc Sablon, August 26, 1927, gneiss point by shore.

Cirsium muticum Michx.

Ste. Genevieve Island, August 23, 1928, beside a rivulet, just above the beach. Blanc Sablon, July 11, 1928, wet slope of steep bank, east side of river.

CIRSIUM ARVENSE (L.) Scop.

Betchewun, August 26, 1928, shallow turf near shore.

**Cirsium minganense* Vict.

Quin Island, September 5, 1929, grassy, sandy area between beach and woods. Described from Quin Island by Frère Marie-Victorin (1925a).

LEONTODON AUTUMNALIS L.

St. Mary Islands, July 25, 1927, turf near boathouse on western island. Not recorded by St. John east of "Natashkwan". Range extension, 98 miles E.

TARAXACUM OFFICINALE Weber.

Ste. Genevieve Island, August 23, 1928, top of limestone shingle beach. Natashquan, June 27, 1928, sandy turf. Kegaska, August 14, 1928, turf near shore of Green Island.

Taraxacum lapponicum Kihlm.

Bradore Bay, June 28, 1927, wet brookside on calcareous sandstone, and June 30, 1927, sandy river-bank on gneiss near head of bay. Recorded by St. John as *T. ceratophorum* (Ledeb.) DC.

*SONCHUS ARVENSIS L.

Betchewun, August 25, 1928, rocky limestone shore. Baie Johan Beetz, August 22, 1928, border of old fox enclosure near shore on granitic rock.

Lactuca spicata (Lam.) Hitchc.

Mascanin, August 20, 1928, grassy shore of small cove. Kegaska River, August 15, 1928, rank vegetation above sand beach west of mouth of river. Harrington Harbour, July 25, 1928, foot of sand and clay bluff beside shore of mainland. Observed also at Seven Islands

(Manowin Island), Betchewun, Ste. Genevieve Island, and Watshishu. Recorded by St. John from "Legardeur: Coacoachou" only. Range extension, 269 miles W. and 42 miles E.

Prenanthes racemosa Michx.

Natashquan, August 9, 1927, hard, rocky roadside near wharf.

Prenanthes nana (Bigel.) Torr.

Kegaska River, August 3, 1927, sandy bank near mouth of river. Kegaska, August 12, 1927, turfy hilltop and sandy dooryard. Blanc Sablon, July 11, 1928, turfy, sandy bank, east side of river.

Hieracium canadense Michx.

Natashquan, August 5, 1927, track in sand dunes, and August 9, 1927, sand dunes. Harrington Harbour, July 25, 1928, foot of sand and clay bluff beside shore of mainland. Not recorded by St. John east of "Lagorgendière: Romaine". Range extension, 59 miles E.

ERRATA

**Agropyron trachycaulum* (Link) Malte, var. *Richardsoni* (Schrad.) Malte in sched. (Vol. XLV, p. 201, col. 1, ll.15-16) should read **Agropyron trachycaulum* (Link) Malte, var. *unilaterale* (Vasey) Malte in sched.

Microstylis monophyllos (L.) Lindl. (Vol. XLV, p. 227, col. 1., l. 4) should read *Malaxis brachypoda* (Gray) Fernald.

In Vol. XLV, p. 228, col. 2, after l. 29, add, under *Populus tremuloides*, var. *rhomboidea:* Recorded from Mingan by Frère Marie-Victorin (1930).

In Vol. XLVI, p. 38, col. 2, ll. 14-16, under *Angelica laurentiana*, for "Fernald (1928) cites several collections from points on the north shore of the Gulf of St. Lawrence" read: Fernald (1926) cites a collection by St. John from La Tabatière.

In Vol. XLVI, p. 40, col. 1, ll. 34-35, for "**Armeria labradorica* Wallr., var. *submutica* Blake, f. *glabriscapa* Blake", read:

**Armeria labradorica* Wallr., var. *submutica* (Blake) n. comb., f. *glabriscapa* (Blake) n. comb.

Statice labradorica (Wallr.) Hubbard & Blake, var. *submutica* Blake, f. *glabriscapa* Blake, Rhodora, 19: 7, 1917.

APPENDIX A

LOCATION OF PLACES MENTIONED

Place	*Township, Archipelago or Seigniory*	*Other Names*	*Lat. N.*	*Long. W.*
Manowin Island	Seven Islands	Ile Manowin	50° 6′	66° 24′
Seven Islands	Letellier Tp	Sept-Iles	50° 12′	66° 23′
Matamek River (mouth)	Blanche Tp	Trout River, Rivière à la Truite	50° 17′	65° 58′
Thunder River	Mingan Seigniory	Rivière au Tonnerre	50° 16′	64° 47′
Magpie	" "		50° 19′	64° 30′
Ile du Havre (Mingan)	Mingan Islands	Harbour Island	50° 17′	64° 1′
Mingan	Mingan Seigniory		50° 18′	64° 1′
Quarry Island	Mingan Islands	Ile à la Proie	50° 13′	63° 48′
Fright Island	" "	Ile du Fantome	50° 13′	63° 41′
Quin Island	" "	Ile Quin	50° 14′	63° 41′
Havre St. Pierre	Mingan Seigniory	St. Peter's Harbour, Eskimo Point, La Pointe aux Esquimaux	50° 15′	63° 37′
Eskimo Island	Mingan Islands	Ile au Marteau	50° 13′	63° 37′
St. Charles Island	" "	Ile St. Charles, Charles Island	50° 12′	63° 17′
Gun Island (Betchewun)	" "	Bald Island, Perroquets St. Charles, Ile aux Calculeaux	50° 12′	63° 13′
Wood Island (Betchewun)	" "	Ile au Bois, Indian Island	50° 12′	63° 12′
Betchewun	Mingan Seigniory	Betchouane	50° 15′	63° 11′
Ste. Genevieve Island	Mingan Islands	Ile Ste. Genèvière	50° 15′	63° 4′
Baie Johan Beetz	Mingan Seigniory	Johan Beetz Bay, Piashte Bay, Piastre Bay, Piashtibaie	50° 18′	62° 49′

Place	*Township, Archipelago or Seigniory*	*Other Names*	*Lat. N.*	*Long. W.*
Watshishu	Mingan Seignory	Watshishow, Little Watshishu River (mouth)	50° 16′	62° 37′
Mascanin	" "	Mushkoniatawee Bay	50° 16′	62° 27′
Natashquan	Natashquan Tp	Natashkwan, American Harbour	50° 12′	61° 50′
Kegaska River (mouth)	Kégashka Tp	Kégashka River	50° 11′	61° 20′
Kegaska (including Kegaska Island)	Washikuti Arch. and Musquarro Tp.	Kégashka, Kégashka Bay	50° 12′	61° 16′
Green Island (Kegaska)	Washikuti Arch	Ile Verte	50° 11′	61° 14′
Bragg's Harbour	" "	Inner end of Seal Reach	50° 11′	61° 7′
Washikuti	" "	Washicoutai, Washsheecootai	50° 12′	60° 52′
Romaine	Lagorgendière Tp	La Romaine, Village Romaine, Gethsemani	50° 13′	60° 41′
The Bluff Harbour	Wapitagun Arch	Long Island Harbour	50° 12′	60° 33′
Fog Island	" "	Ile à la Brume	50° 10′	60° 31′
Coacoacho	Peuvret Tp	Coacoachou	50° 16′	60° 18′
Wolf Bay	Lièvard Tp	Baie des Loups	50° 13′	60° 13′
Cormorant Rocks	Wapitagun Arch		50° 10′	60° 3′
Lake Island	" "	Ile du Lac	50° 11′	60° 3′
Wapitagun	" "	Ouapitagone	50° 12′	60° 1′
Wapitagun Island	" "	Ile Ouapitagone	50° 12′	60° 0′
Matchiatik Island (Wapitagun)	" "		50° 12′	59° 59′
Etamamu River (island near mouth of)	St. Mary Arch		50° 15′	59° 57′
Pointe au Maurier	Charnay Tp	Sealnet Point	50° 20′	59° 49′
Watagheistic Island	St. Mary Arch	Ile Watagheistic, Old Edward's Island	50° 23′	59° 48′
Yankee Harbour	" " "	Middle Islands, Ile Galibois	50° 17′	59° 48′
Boat Islands	" " "	Iles Perroquets	50° 17′	59° 43′
St. Mary Islands	" " "	Iles Ste. Marie	50° 18′	59° 38′
Harrington Harbour	Little Mecatina Arch. (mainland in St. Vincent Tp.)	Iles Harrington	50° 30′	59° 28′
Aylmer Sound	Little Mecatina Arch	Détroit Aylmer	50° 35′	59° 21′
Little Mecatina Island	" " "	Ile Petit Mécatina	50° 33′	59° 17′
Whale Head (Jas. Mauger's harbour)	Great Mecatina Arch	Tête à la Baleine	50° 37′	59° 13′
Sholiaban	Céry Tp		50° 44′	59° 15′
Mecatina Bird Sanctuary.	Great Mecatina Arch		50° 43′	59° 7′
Mutton Bay	Boishébert Tp	Baie des Moutons	50° 46′	59° 1′
La Tabatière	" "	Spar Point	50° 50′	58° 58′
Great Mecatina Island	Great Mecatina Arch	Ile Gros Mécatina, Grosse Ile	50° 48′	58° 52′
Mauger Island	Kécarpoui Arch	Ile Mauger	51° 3′	58° 48′
Rapide Lessard	Cook Tp	Jacques McKinnon's Rapid	51° 4′	58° 47′
Little Rigolet Island	Kécarpoui Arch	Ile du Petit Rigolet	51° 8′	58° 40′
St. Augustin Island	" "	Ile du Vieux Poste	51° 7′	58° 29′

Place	*Township, Archipelago or Seigniory*	*Other Names*	*Lat. N.*	*Long. W.*
St. Augustin Square	Kécarpoui Arch	Carré St. Augustin	51° 8′	58° 27′
Dukes Island	St. Augustin Arch	Ile du Duc	51° 12′	58° 23′
Mistanoque Island	" " "	Part of "Shecatica" or "Shekatika"	51° 16′	58° 12′
Lobster Bay	Marsal Tp	Baie des Homards	51° 22′	58° 2′
Rocky Bay	Pontchartrain Tp	Baie des Rochers	51° 18′	58° 1′
Mainland west of Net Island.	" "		51° 23′	57° 53′
Net Island	Old Fort Arch		51° 23′	57° 52′
Old Fort Island	" " "	Ile du Vieux Fort, Vieux Fort au large	51° 22′	57° 46′
Bonne Esperance	" " "		51° 24′	57° 40′
Caribou Island	" " "	Ile de la Demoiselle	51° 24′	57° 37′
Salmon Bay	Bonne Esperance Tp	Baie au Saumon	51° 24′	57° 36′
Basin Island	Blanc Sablon Arch	Island of Ledges, Ile du Bassin	51° 28′	57° 15′
Bradore Bay	Brest Tp	Bras d'Or	51° 28′	57° 14′
Anse des Dunes	" "	Sandy Bay	51° 26′	57° 12′
Lourdes de Blanc Sablon.	" "	Longue Pointe, Long Point	51° 25′	57° 11′
Greenly Island	Blanc Sablon Arch	Ile Verte	51° 22′	57° 10′
Mount Cartier	Brest Tp	Highest of "Bradore Hills"	51° 34′	57° 9′
Blanc Sablon	" "	Anse Sablon	51° 25′	57° 8′
Ile au Bois	Blanc Sablon Arch	Wood Island	51° 23′	57° 8′

APPENDIX B

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NOTES AND OBSERVATIONS

SWALLOWS AT PLAY.—Just before dark on Sunday, June 14, 1931, at Dow's Lake, Ottawa, with the weather very sultry and a storm impending, with swallows flying low, I noticed what looked like a free fight in the air among some dozen or more of these birds, but on closer attention saw that they were playing with a white feather about four inches long. They passed it around, dropped it and caught it again before it reached the water.

After some minutes they let it fall to the water, where it remained for a while when one swallow swooped, caught it up and the game started over again and lasted until the squall struck the lake.

Some years ago a flock of ducks (domestic crossed with mallard) used to visit my boathouse at Black Rapids. They were very friendly and would come when called. They were very playful and would chase a bit of stick on a string and quack their appreciation of one's attention.—MARK G. MCELHINNEY.

NOTE ON LAKE ATHABASCA WHEAT.—In a geographical paper on Canada North of Fifty-six Degrees published in *The Canadian Field-Naturalist*[1] in 1928, it was stated without citing the source of the information, that wheat from north of 56° had won a prize for excellence at the Philadelphia Centennial Exhibition in 1876. Having made no record of the source of this important information the writer wishes to quote here a

[1] *Can. Field-Nat.* 42: 53, March, 1928.

reference to this early demonstration of Canada's ability to produce wheat far to the north, which has lately come to his notice, published eight years after the Philadelphia Exhibition. The Rev. Emile Petitot who travelled widely in Northern Canada, and knew its natural history and geography as no other missionary has known them, wrote of the Athabasca district:

"It should be noted that the climate of the lake (Athabasca) is far from being an obstacle to the ripening of cereals and vegetables, for at the Philadelphia Centennial Exhibition in 1876 the Catholic Mission near Fort Chipewyan obtained a silver medal and honourable mention for cereals of the first quality and remarkable size."[2]

The earliest reference to the fossil tree trunks found in the tar sands along the Athabasca river were published in this article. He states that:

"Remarkable vegetable fossils are often found in the sandstone of this part of the Athabasca, imbedded in the rock, but capable of detachment with the hammer. I have noticed whole trunks of *Cupressoxylon* (probably a Sequoia), charcateristic of the Tertiaries, and have sent specimens to Montreal and Paris."—E. M. KINDLE.

[2] "On the Athabasca District of the Canadian North-West Territory", *The Canadian Record of Natural History and Geology* 1: 27-52, 1884.

On November 21st, 1931, there passed away at his home in Annapolis Royal, Nova Scotia, John Leo DeVany, a highly respected citizen. Mr. DeVany was born at Dalhousie, Annapolis County, N.S., in 1867, and during his earlier life taught school at Bear River, N.S. Later he was proprietor and editor of the Annapolis *Spectator*, which position he filled with much credit to himself. During the late war he served his country in France and on his return to Canada, received an appointment as Migratory Bird Warden under the Department of the Interior, which position he creditably filled until his death. Being a sportsman and lover of the outdoors, he was naturally interested in the bird life of the Province and from time to time submitted articles to *The Canadian Field-Naturalist* for publication. His wife and one daughter survive him.—R. W. TUFTS.

CORRECTION.—The record of the two species of Kinglet in the Christmas Bird Census report from Comox, Vancouver Island, B.C., in *The Canadian Field-Naturalist* for February, 1932, page 41, column 1, lines 37-38, should read: "Western Golden-crowned Kinglet, 35*; Sitka Kinglet, 1"; and the record of the Ruby-crowned Kinglet on the same page, column 2, lines 16-17, should read: "Sitka Kinglet, 1".—EDITOR.

BOOK REVIEWS

FLORE-MANUEL DE LA PROVINCE DE QUEBEC. *Father Louis-Marie. Agricultural Institute of Oka, Que. 320 pages, with more than 2100 drawings by Marcel Makhes, 1931.*

This Manual of the Flora of the Province of Quebec is primarily intended for schools, convents, commercial, classical and agricultural colleges, and for the universities of the Province of Quebec. That is to say, it is written both for beginners and for more advanced students of botany. Introducing the science of botany to the former class, the author devotes the first part of the Manual to General Botany, with seven short chapters on cells and tissues; roots and their functions; stems and their structure and functions; leaves and their forms, disposition on the stem, and functions; flowers and inflorescences, their structure and functions; the different types of fruit; seeds and their germination. The second part of the Manual opens with a most useful chapter containing directions for collecting and preserving plants and for making a herbarium.

The reviewer feels that the author is particularly to be commended for including the above mentioned chapters in his Manual, for no doubt this initiation into the mysteries of botany will materially help the beginner to approach the study of the flora of Quebec with more confidence than if a Flora of the traditional type were put into his hands.

As the Manual is primarily intended for pupils of educational institutions, many species found only in districts difficult of access, or species of difficult genera, are either omitted or mentioned *en passant*, and special attention paid to the flora of the, educationally speaking, more compact parts of Quebec. The descriptions of the species are brief but, as the author points out, the student will find many characteristics, which are omitted in the text, emphasized in the numerous, well-made drawings. It would, in the reviewer's opinion, have been advisable, however, if the illustrations had been printed on a better type of paper.

A feature of the Manual that no doubt also will find favour with the students is that notes on medicinal and other properties of many of the native plants are given, and that many cultivated plants, related to wild ones, are mentioned.

Father Louis-Marie is to be sincerely congratulated on his achievement in presenting to the youth of the Province of Quebec, as well as to more

advanced students in general, his "Flore-Manuel" a contribution to education and science which, most assuredly, will do much to stimulate an interest in botany, not only in his native Province, but outside as well. The reviewer hopes to see the Manual translated into English.—M. O. MALTE.

PARASAUROLOPHUS TUBICEN N.SP. AUS DER KREIDE IN NEW MEXICO (*P. tubicen* n.sp. from the Cretaceous of New Mexico). *By C. Wiman. Nova Acta Regiæ Societatis Scientarum Upsaliensis, Ser. IV, Vol. 7, No. 5, 11 pp. 3 pls., Uppsala, Sweden, 1931.*

Professor Wiman, of the Royal University, Uppsala, has made several important contributions recently to our knowledge of Cretaceous dinosaurs, especially those of China and New Mexico. The present paper is of special interest to students of Canadian dinosaurs, for the genus *Parasaurolophus* has been known hitherto only by a nearly complete skeleton from the Belly River formation of Alberta, preserved in the Royal Ontario Museum at Toronto. *Parasaurolophus walkeri*, the Canadian species, is a duck-billed dinosaur, belonging, in spite of its name, to the helmet crested group, the Lambeosaurinæ. It is particularly distinguished by a long, curved, backwardly directed crest, a bizarre extension of the premaxillary and nasal bones.

Wiman's new species was collected by Mr. Charles H. Sternberg from the Ojo Alamo formation of San Jaun county, New Mexico. This subdivision of the Upper Cretaceous, on the evidence of invertebrate fossils, is of about the same age as the dinosaur-bearing Edmonton formation of Alberta, *i.e.*, younger than the Belly River beds. In view of this marked extension of the geological and geographic range of the genus it is unfortunate that the new species is represented only by fragments of the skull and the posterior portion of the characteristic crest. The natural association of the material apparently is not in question.

The species *tubicen* is differentiated from *P. walkeri* by a somewhat greater size, a differently shaped termination to the crest, and a dissimilar jugal (cheek) bone. Wiman concurs with Gilmore and Abel in the view of relationships expressed above, *i.e.*, that the genus is lambeosaurine.

The detailed description of the skull fragments, which make up a large part of the left side, as well as the occipital region, need not be reviewed here. It may be noticed, however, that the crest has the two lateral grooves seen in *P. walkeri*, but is more tapering at the posterior termination.

Like most of his European colleagues, Professor Wiman is not content to close his paper with the mere description of the remains, but devotes several concluding pages to the biological significance of the extraordinary crest of *Parasaurolophus*. He apparently views with favour Baron Nopcsa's conclusions that such outgrowths are secondary sexual characters. This hypothesis is not yet acceptable to most North American students, because of the fantastic conclusions that are associated with it. Abel's views, that the crest served both as a weapon and as a means of enlarging the olfactory areas of the nasal passages, are regarded with doubt by Wiman, especially the second hypothesis. By comparison with vocal structures in swans and cranes, and by analogy with certain musical instruments of Sweden, our author finally concludes that the crests of the lambeosaurs were resonating organs. "It seems quite likely to me," he says, "that the male *Parasaurolophus* summoned his harem together by means of his amplified voice."

Wiman recognizes certain evolutionary trends in the development of these reptilian "trumpets". He sees the earlier stages in *Kritosaurus*, with elevated nose bones, and *Cheneosaurus*, with an incipient crest. From here development was divergent, and three lines resulted, one culminating in *Corythosaurus* and *Hypacrosaurus*, another in *Lambeosaurus*, and the third in *Parasaurolophus*.

To the North American critic Wiman's biological conclusions seem jeopardized by their foundation on a doubtful hypothesis, that of Nopcsa, and the geneologies appear to neglect too much the skeleton as a whole, as well as the stratigraphic relationships. Nevertheless, we are indebted to the author not only for the anatomical data that he supplies, but also for his very interesting contribution to the palæobiology of these curious reptiles. Vertebrate palæontologists on this side of the Atlantic make all too few attempts to revitalize the objects of their studies.—L. S. RUSSELL.

AN INTRODUCTION TO THE LITERATURE OF VERTEBRATE ZOOLOGY. *Based chiefly on the Titles in the Blacker Library of Zoology, The Emma Shearer Wood Library of Ornithology, The Bibliotheca Osleriana and Other Libraries of McGill University, Montreal. Compiled and edited by Casey A. Wood, M.D., LL.D. Oxford University Press, London, 1931. $15.00.*

The Frontispiece, a reproduction of a painting of the Dodo, probably from life, is a hint of the literary and artistic treasures to be found in the

great zoological library of which this is a catalogue.

The first part is an introduction to the literature of vertebrate zoology by Dr. Casey A. Wood, then follows a catalogue of the library. There is also a preface and various indexes. The introduction is wide in scope and an invaluable guide to the literature of zoology. Some of the chapter headings are:—"The Beginnings of Zoological Records", "Medieval Writers on Zoology", "The Literature of Comparative Zoology". Here and there through the chapters the collector gets the better of the commentor, but it is not until the last chapter, "Unique and Rare Printed Books, Manuscripts and Drawings in the Zoological Libraries of McGill University" that the bibliophile and author are one, in describing the astonishing collection of rare books, manuscripts and drawings brought together by the author and placed at the service of the student. The annotated catalogue forms the second and greater part of the volume; included are items from the Osler Library of the History of Medicine, the Gest Library of Chinese Literature, and the General Library of McGill University. The principal items are from two sources, the Emma Shearer Wood Library of Ornithology and the Blacker Library of Zoology; both contributed and endowed by Canadians through the vision, enthusiasm and direction of the compiler, himself Canadian born. During and after the Great War it was possible to secure books and manuscripts that would not otherwise have been available for a Canadian library. Fortunately for Canada, Dr. Wood understood the importance of the time, and the future need in Canada for a library of zoological literature of outstanding importance. This has been accomplished and Dr. Casey A. Wood will always be remembered as the originator and builder of the library whose contents are catalogued in the present volume.—J.H.F.

EXCURSIONS OF
The Ottawa Field-Naturalists' Club, 1932

Do not collect any specimens except for scientific purposes.

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The Canadian Field-Naturalist

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*TWO NEW THEROPOD DINOSAURS FROM THE BELLY RIVER FORMATION OF ALBERTA**

By C. M. STERNBERG, Geological Survey, Canada

OBSERVANT collectors and students of vertebrate palæontology, who have studied the Belly River and Edmonton faunas fully realize that, in spite of the many fine dinosaurian specimens which have been collected from these beds in recent years, many forms are still imperfectly known. Perhaps the light-limbed theropods are among the least known of these dinosaurs. Three genera of light-limbed theropods have been described from the Belly River formation of Alberta but only one, *Struthiomimus*, is represented by a considerable part of the skeleton. The scarcity of fossilized remains of these forms may be due partly to the frailness of the bones and in part to a possible upland habitat. As these beds are essentially delta and flood-plain deposits complete skeletons of the animals, which lived back from the streams or far away from the deltas, would seldom be buried intact. In view of the scarcity of such remains it was with great satisfaction that, during the field season of 1928, the writer discovered, in the Belly River formation of Alberta, two distinct, undescribed, forms of light-limbed theropods.

Classification and Discussion

Vertebrate palæontologists do not fully agree on the classification of the Theropoda. Gilmore[1] and Nopcsa[2] refer the deinodonts to the Megalosauridæ whereas Matthew and Brown[3] and Huene[4] regard them as more nearly related to the Ornithomimidæ. Gilmore and Matthew and Brown refer *Ornithomimus* and *Cœlurus* to distinct families, the Ornithomimidæ and Cœluridæ while Nopcsa refers both to the family Compsognathidæ. For the purpose of this paper the deinodonts, ornithomimids and cœlurids are regarded as representing distinct families all of which are somewhat closely related.

Gilmore regards *Ornitholestes* as a synonym of *Cœlurus* (loc. cit., p. 127) and Matthew and Brown state that there can be no doubt that they are closely related and "that the characters of the cœlurid group can therefore be defined from *Ornitholestes*". For the present however the generic name *Ornitholestes* will be retained.

One of the specimens about to be described (Cat. No. 8538) is referred to the Ornithomimidæ and the other (Cat. No. 8539) to the Cœluridæ.

Some of the outstanding differences between the Ornithomimidæ and the Cœluridæ, as shown in the feet, are as follows. In the Ornithomimidæ the metacarpals are of subequal length and their distal ends are rounded. Metatarsals II and IV are long, slender and subequal in length whereas III is longer and much broader at the distal end but the shaft is greatly reduced proximally and almost, or quite, pinched out between the enlarged proximal ends of II and IV. In the Cœluridæ the metacarpals are of unequal length, slender, have deeply grooved, ginglymoid distal facets and metatarsal III is not reduced proximally. In the Deinodontidæ the median metatarsal is reduced proximally as in the Ornithomimidæ whereas the metacarpals, though proportionately very different, resemble the Cœluridæ in being of unequal length and having deeply grooved distal facets. It is most likely, as suggested by Matthew and Brown, that these three families were derived from a common ancestor.

Osborn states that the known Ornithomimidæ are confined to the Upper Cretaceous[5] but von Huene (loc. cit. p. 98) is inclined to the opinion that they had a much longer range.

The Ornithomimidæ are represented in the Belly River rocks by *Struthiomimus altus* (Lambe) and *S. samueli* Parks. A very fine skeleton of *S. altus*, in which most of the important parts of the skeleton are shown, was described by Osborn in 1916 (loc. cit.). The only representatives of the Cœluridæ to be thus far reported

* Published by permission of the Director of the Geological Survey of Canada.

[1] Gilmore, C. W., Bull. 110, U.S. Nat. Mus. 1920. p. 116.

[2] Nopcsa, Baron F., The Genera of Reptiles, Palæobiologica, Band 1, 1927, p. 113.

[3] Matthew, W. D., and Brown, B., Bull. A.M.N.H. New York, Vol. 46, Art. VI. 1922.

[4] Huene, F. von, Revista des. Museo de La Plata, Toma 29, 1926, pp. 90-107.

[5] Osborn H. F., Bull. A.M.N.H. New York Vol. 35, 1916, p. 738.

from the Belly River formation were described by Gilmore under the name *Chirostenotes pergracilis*[6].

A third adequate type of small theropodus dinosaur, from the Belly River formation, was described by Matthew and Brown[7] as *Dromæosaurus albertensis* and placed in a distinct subfamily, the Dromæosaurinæ which was provisionally referred to the Deinodontidæ. This species was based on a considerable portion of the skull with teeth and some foot bones. Unfortunately none of the skull or teeth is preserved with the specimens here described and the foot bones, preserved with the type of *Dromæosaurus*, have been temporarily misplaced so they are not available for comparison but, as will be shown later, neither of the specimens, here described, can be referred to that genus. There are disarticulated phalanges, in the Geological Survey collections, which are quite unlike those of either of the new species under consideration but which may pertain to *Dromæosaurus*.

In 1865 Leidy described a light-limbed theropod[8] from the greensands of New Jersey as *Cœlosaurus antiquus*. The types are (1) a complete tibia and (2) portions of tibia and metatarsal and phalanges. Matthew and Brown state that "It would appear that this genus is closely allied to *Struthiomimus* Osborn, and *Ornithomimus* Marsh, and perhaps identical with one or both". (loc. cit. p. 374). The external face of the distal end of the tibia of specimen No. 8538 has a moderately broad flat surface whereas Leidy's illustration shows the external edge of the distal end of the tibia of *C. antiquus* as making an acute angle. The phalanges of Leidy's second specimen are proportionately shorter than those of No. 8538. As the second specimen about to be described is a cœlurid there is little chance of its being congeneric with *C. antiquus*.

In 1924 Osborn described three new genera of small theropods from beds of Lower Cretaceous age in Mongolia[9]. It is very fortunate that in each of these types a fine skull, jaws and foot bones are preserved. Aside from the great geographical difference and the difference in age between the Mongolian beds from which Osborn's types were collected and the Belly River beds in Alberta, it seems clear that the Alberta specimens are quite distinct from those from Mongolia.

The two phalanges figured by Osborn as part of the type of *Velociraptor mongoliensis* appear to be very much like homologous bones of *Chirostenotes pergracilis*. The association, in *Velociraptor*, of very narrow, slender, penultimate phalanx and very narrow, strongly decurved ungual with the long slender dentary shows that Gilmore was probably correct in referring the long slender Belly River dentaries to *Chirostenotes*. *Velociraptor* appears to be more nearly like *Chirostenotes* than either of the genera here described and might well be regarded as ancestral to *Chirostenotes*.

Osborn's second type *Saurornithoides mongoliensis* is quite different from either of the specimens here described as shown by comparison of the hind feet, the phalanges of which are much shorter than in No. 8538 and of very different proportions from those of No. 8539. The third Mongolian specimen described by Osborn, as *Oviraptor philoceratops*, appears also to be quite distinct from the Belly River forms. The very peculiar modification of the skull at once removes it from the Cœluridæ and the manus is so different from that of *Struthiomimus* that there is little probability of specimen No. 8538, which is an ornithomimid form, being congeneric with *Oviraptor*. Though Osborn refers *Oviraptor* to the Ornithomimidæ he points out that the extremely elongate second digit is analogous to that of *Ornitholestes* and of *Chirostenotes* rather than to that of the more symmetrical digits of *Struthiomimus*.

Macrophalangia canadensis, gen. et sp. nov.

Plate I, Fig. 1.

Type: No. 8538, Geological Survey of Canada, consists of the distal extremity of the right tibia with part of the astragalus, two incompletely preserved distal tarsals, and a complete right hind foot except part of the proximal halves of metatarsals III and IV.

Locality and horizon. South end of deep cut on C.N.R. grade about 2 miles south-west of the mouth of Berry Creek (Steveville), Red Deer River, Alberta: about 100 feet below top of Belly River formation, Upper Cretaceous.

Characters. External edge of distal end of tibia moderately broad and flat; pes long and slender; Mt. III reduced in proximal portion but visible from front view; Mt. I developed distally; Mt. V represented by small proximal splint; phalanges long and slender; digits II, III and IV about equal, in length, to corresponding metatarsals; unguals long, pointed, narrow superiorly and decurved.

The external edge of the distal end of the tibia of No. 8538 is of moderate breadth and flat or slightly concave. This flat surface is 15 mm. broad and at right angles to the longer axis of the

[6] Bull. No. 38, Geol. Surv. of Can. 1924. pp. 1-12, pl. 1.
[7] Bull. A.M.N.H., Vol. 46, 1922, pp. 383-5.
[8] Leidy J., Smith. Contr. to Knowl. Vol. 14, p. 100, Pls. 3, Fig. 3 and 17, Figs. 6-11; 1865.
[9] Osborn, H. F., Amer. Mus. Novitates No. 144. Nov. 1924.

PLATE NO. I

FIGURE 1. FIGURE 2.

FIGURE 1.—*Macrophalangia canadensis*, Type No. 8538, Geological Survey, Canada. ¼ natural size.

FIGURE 2.—*Stenonychosaurus inequalis*, Type No. 8539, Geological Survey, Canada. Slightly less than ¼ natural size.

distal end of the bone except at the posterior angle of the extremity where it rises to the somewhat enlarged external condyle. The breadth of this face is more than half the greatest fore and aft diameter of the distal end of the bone.

Except for the great difference in size the astragalus seems to more nearly resemble that element in *Gorgosaurus* than in *Struthiomimus*. Much of the ascending process is missing so its height can not be given.

The extreme proximal ends of all the metatarsals are preserved, except the anterior face of IV. All the elements of the foot were naturally articulated and beautifully preserved. Digit No. IV was partly folded under No. III and some of the phalanges had suffered slight crushing but these have been restored. This digit was moved slightly but the rest of the bones are preserved as found. Plate I, Figure 1, in which the restoration of the proximal ends of Mts. III and IV is shown in lighter colour, gives a very good idea of the foot except for metatarsal V which is completely hidden from view by the restoration of metatarsal IV.

The proximal end of metatarsal III is preserved and shows as a small, laterally compressed, tip very similar to the homologous portion of this bone in *Struthiomimus altus* except that it was visible from the front view. The tip is preserved for 20 mm. but the rest of the upper three-fifths of this bone was destroyed by erosion. The preserved portions, however, show conclusively that the median metatarsal was reduced in its proximal portion, trigonal, and the inferior sides were appressed to the lateral metatarsals. The metatarsals are long and slender and the phalanges are very long.

While this genus is clearly distinct from *Struthiomimus* and *Ornithomimus*, as shown by the presence of digit I, the greatly elongated phalanges and the decurved unguals, it would appear to be referable to the family Ornithomimidæ. Of course there is the possibility of its falling within the subfamily Dromæosuarinæ but this is not considered probable because, if the foot bones, preserved with the type of *Dromæosaurus*, pertain to the pes they appear to be totally different from those of *Macrophalangia canadensis*. On the other hand if they pertain to the manus, as believed by Matthew and Brown, they would appear to be very different from what one would expect in an animal with such long slender digits, in the hind foot, as are seen in *M. canadensis*. No figure of these foot bones was published but their description by Matthew and Brown and their further discussion by Gilmore (loc. cit. pp. 3-4) seems to show clearly that they pertain to an animal which was structurally very unlike that here described.

The most outstanding feature of the pes of *Macrophalangia canadensis* (Plate I, Figure 1) is the long slender phalanges, to which the

generic name alludes. The phalangeal formula is the same as that of *Struthiomimus* except for the presence of digit I but in *M. canadensis* the phalanges are all much longer, more slender, and the unguals are more compressed laterally, and curved. Digits II and IV are subequal in length and all three are of approximately the same length as their respective metatarsals. In *Struthiomimus* the metatarsals are about twice as long as the corresponding digit. Digit IV, of *M. canadensis* is slightly longer than II while the reverse is true in *Struthiomimus altus*. The foot is not a highly developed cursorial type as seen in *Struthiomimus* nor would it appear to have the same grasping power as in the other species about to be described (No. 8539).

Metatarsals II, III and IV differ from those of *Struthiomimus* in that they are less elongated and number III is not so broadly expanded in its distal portion or so much reduced in the proximal half and is visible throughout from the anterior view. As in the deinodonts and cœlurids, only the distal portion of metatarsal I was developed. As shown by its position in the rock, it was attached to the lower half of metatarsal II. Metatarsal V is preserved proximally as a small round splint about 60 mm. in length. It is not visible from the anterior view.

All of the phalanges are long and slender and the distal facets are moderately grooved, the superior surfaces of the distal ends are laterally compressed and the unguals are narrower above than below. The unguals are moderately high, long, sharply pointed and slightly curved. They are narrower inferiorly than those of *Struthiomimus* but broader than those of specimen No. 8539. All of the unguals have well defined lateral grooves. These grooves are quite narrow and deep in the distal portion but as they proceed backward they become shallower and broader and finally terminate before reaching the infero-proximal angle. The tips of the unguals were so frail and so badly cracked that it was not possible to save them. The measurements given for these bones are, therefore, the estimated lengths.

MEASUREMENTS OF PES

Width of three metatarsals proximally	56 mm.
Width of three metatarsals distally	70 mm.
Width of metatarsal III	35 mm.
Length of Mt. II	205 mm.
" " " III	230 mm.
" " " IV	212 mm.
" " articulated digit I	100 mm.
" " " " II	190 mm.
" " " " III	220 mm.
" " " " IV	200 mm.
" " phalanx 1 of digit I	58 mm.
Length of phalanx 1 of digit II	78 mm.
" " " 2 " " II	63 mm.
" " " 3 (ungual) of digit II about	60 mm.
" " " 1 of digit III	75 mm.
" " " 2 " " III	52 mm.
" " " 3 " " III	58 mm.
" " " 4 (ungual) of digit III about	60 mm.
" " " I of digit IV	59 mm.
Greatest height of ungual of digit II and III	23 mm.
Greatest breadth of ungual of digit II and III	16 mm.

Stenonychosaurus inequalis gen. et sp. nov.
Plate I, Fig. 2; Plates II and III

Type: No. 8539, Geological Survey of Canada, consists of distal end of tibia with astragalus; complete left hind foot; left metacarpal I; distal end of (?) Mc. II; distal ends of three phalanges of the manus and six more or less complete caudal vertebrae.

Locality and Horizon: N.W. ¼ Sec. 21, T. 21, R. 12, W. of 4th principal meridian, about 2½ miles south-west of the mouth of Berry Creek (Steveville), Red Deer River, Alberta. About 160 feet below the top of Belly River formation, Upper Cretaceous.

It is quite evident that the greater part of the skeleton was buried intact as shown by the presence of fragments of different parts, but all but the left hind foot and the distal end of the tibia, with astragalus, had weathered out before discovery. The foot lay prone and was completely exposed and badly weathered on the upper surface but, except for the unguals of digits II and III, the elements were all naturally articulated. Plaster of Paris was mixed with water and poured over the foot. This kept all the bones in position and, when set, took the place of the rock. The specimen was then prepared from the other side and thus nothing was disturbed or lost and most of the important details were preserved. Most of the phalanges of digit IV were split longitudinally and there is a possibility that in mending these the proximal two may have been slightly broadened. Plate I, Fig. 2, shows the specimen very well, as it was found and is preserved, and Plate III is a drawing, in perspective, made by Mr. A. Miles. It is drawn at about three-quarter side view and gives a very good idea of the peculiarly specialized digit II.

Stenonychosaurus inequalis falls within the family Cœluridæ as shown by the slender proportions; the short, stout, divergent Mc. I with deeply grooved, ginglymoid, distal facet; the

long slender manus and the non-reduction, proximally, of Mt. III.

Characters. Slender proportions; bones of feet hollow but not extremely thin walled; Mc. I very short, strongly divergent distally, with deeply grooved ginglymoid distal facet; phalanges of manus elongate; Mt. III not reduced proximally; Mts. I and V present; Digit I short, Digit II much shorter than III or IV and peculiarly specialized; distal ends of penultimate phalanges deeply grooved; ungual of Digit II very large; unguals high proximally, laterally compressed and strongly decurved; distal caudal centra not hollow, but long and slender, inferior surface longitudinally grooved; articular faces of caudals amphiplatyan.

Stenonychosaurus appears to most nearly resemble *Ornitholestes* though there is no doubt as to its generic distinction as shown by the much greater size; thicker bone wall; unequal length of the digits of pes; compressed ungual phalanges of the pes and amphiplatyan caudal centra.

FRONT FOOT

Metacarpal I (Pl. II, fig. 1) resembles that of *Ornitholestes hermani* as figured by Osborn[10]. It was closely appressed to Mc. II throughout most of its length but the distal facet was strongly divergent The main shaft of the bone is roughly triangular in cross section with the apex directed outward. The distal end is enlarged and has a deeply grooved ginglymoid facet. This metacarpal differs from Mc. I of *Chirostenotes pergracilis* in being much shorter and stouter, having a more greatly enlarged and more divergent distal end and a thicker bone wall.

The distal ends of three phalanges and one (?) metacarpal are preserved and indicate a long slender manus. One of these is larger than the others and more deeply grooved. It probably represents the distal extremity of Mc. II. It is possible that digit III was reduced as in *Ornitholestes* and *Chirostenotes* and that no parts of it are preserved with the specimen but there are no very slender phalanges present.

[10] Osborn, H. F. Skeletal Adaptations of *Ornitholestes, Struthiomimus, Tyranosaurus.* Bull. A. M. N. H., Vol. 35, 1916, Fig. 3.B.

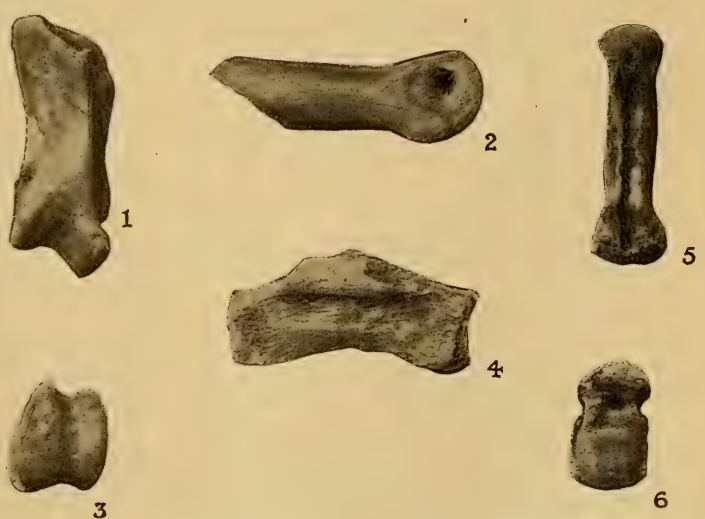
The most complete of these phalangial fragments (Pl. II, Fig. 2) resembles phalanx 2 of digit II of *Chirsotenotes pergracilis* but is slightly larger and has a much thicker bone wall. It probably was fully as long as in *Chirsotenotes.* The distal facet is not so deeply grooved as in the metacarpal but the articulating surface extends well down and back as in *Chirostenotes* ,and suggests considerable grasping power. Fig. 3 of Pl. II shows the distal end of another phalanx which may represent No. 1 of digit II. As in No. 2 of this digit, it is not as deeply grooved as the metacarpal. The articulating surface extends farther back on the superior face but not so far inferiorly. It is slightly broader than No. 2 but considerably narrower than what is regarded as Mc. II.

It is possible that, when more is known of this genus and of *Chirostenotes,* they may prove to be congeneric but this is not considered probable because the great difference in Mc. I, and the thickness of the bone wall of the phalanges of the manus, would suggest a very different manus in the two genera and probably when more homologous parts are discovered they will show many other differences.

HIND FOOT

The distal end of the tibia is of somewhat lighter

PLATE NO. II



Stenonychosaurus inequalis, Type No. 8539, Geological Survey, Canada. Natural size.

FIGURE 1.—Metacarpal I. Superior view.
FIGURE 2.—Phalanx of manus. Side view.
FIGURE 3.—Distal end of phalanx of manus.
FIGURE 4.—Distal caudal centrum. Side view.
FIGURE 5.—Distal caudal centrum. Inferior view.
FIGURE 6.—End view of distal caudal centrum.

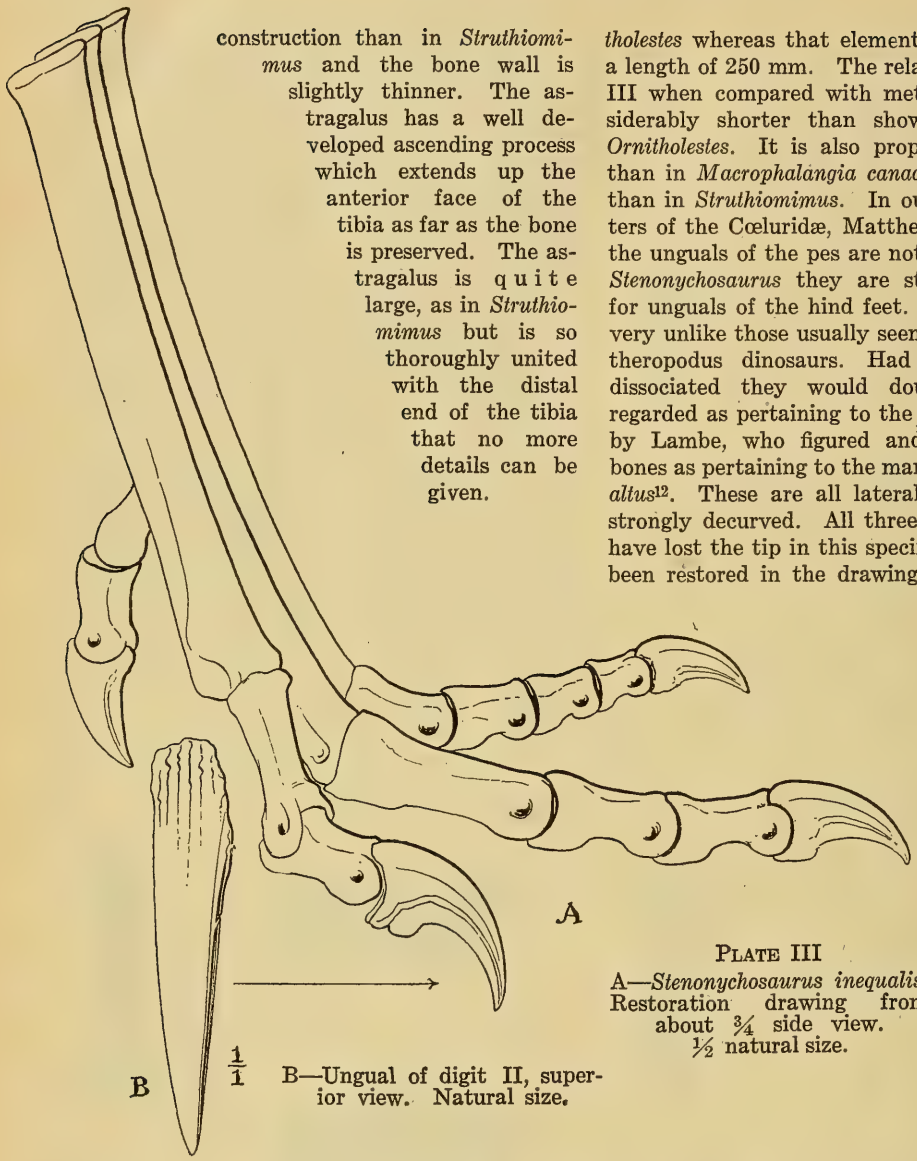


PLATE III

A—*Stenonychosaurus inequalis*. Restoration drawing from about ¾ side view. ½ natural size.

B—Ungual of digit II, superior view. Natural size.

construction than in *Struthiomimus* and the bone wall is slightly thinner. The astragalus has a well developed ascending process which extends up the anterior face of the tibia as far as the bone is preserved. The astragalus is quite large, as in *Struthiomimus* but is so thoroughly united with the distal end of the tibia that no more details can be given.

Five metatarsals are preserved but, as in most Upper Jurassic and Cretaceous Theropoda, No.I is represented by only the distal portion of the bone and No. V by a proximal splint. The most outstanding characters of the pes are the inequality in length of the three functional digits, the peculiar specialization of the second digit and the lateral compression of the ungual phalanges to which the generic name alludes.

Comparison of the hind feet, would suggest that *Stenonychosaurus inequalis* was about twice as large as *Ornitholestes hermani*. Osborn[11] gives a length of 117 mm. for metatarsal III of *Ornitholestes* whereas that element in *S. inequalis* has a length of 250 mm. The relative length of digit III when compared with metatarsal III is considerably shorter than shown by Osborn for *Ornitholestes*. It is also proportionately shorter than in *Macrophalangia canadensis* but is longer than in *Struthiomimus*. In outlining the characters of the Cœluridæ, Matthew and Brown state the unguals of the pes are not compressed but in *Stenonychosaurus* they are strongly compressed for unguals of the hind feet. These unguals are very unlike those usually seen in the hind feet of theropodus dinosaurs. Had they been found dissociated they would doubtless have been regarded as pertaining to the manus as was done by Lambe, who figured and described similar bones as pertaining to the manus of *Ornithomimus altus*[12]. These are all laterally compressed and strongly decurved. All three functional unguals have lost the tip in this specimen but these have been restored in the drawing. The lateral compression is about the same throughout the depth of the unguals thus differing from *Macrophalangia*, *Struthiomimus* and *Gorgosaurus* in all of which the unguals are much broader at the base. The lateral grooves are very shallow and run from the inferoproximal angle to the tip. The distal facets of the penultimate phalanges are deeply grooved but in the other phalanges of digits III and IV the distal facets are gently concave laterally. The foot was not of a strongly developed cursorial type but must have had considerable grasping power.

Metatarsal I is quite small. There is no sign of a facet on Mt. II for its attachment but it is probable that it is not much displaced in the specimen and that in life it occupied a position on the postero-external side of Mt. II as in the

[11] Osborn, H. F. Bull. A.M.N.H., Vol. 35, p. 737, 1916.

[12] Osborn and Lambe. Cont. to Can. Pal., Vol. 3, Pt. II, 1902. Pl. 14, Fig. 10-11.
Lambe, L. M. The Grasping Power of the Manus of *Ornithomimus altus*. *The Ottawa Naturalist*, Vol. 18, oN. 2, 1904.

Deinodontidæ. When compared with *Macrophalangia* the first phalanx of digit I is very short and stout. The ungual is of moderate size slightly curved and laterally compressed.

Metatarsal II is much shorter than Mt. III or IV. It is only 210 mm. long whereas III is 250 mm. and IV 240 mm. in length. Phalanx 1 of digit II is of moderate length, the distal end has a deeply grooved facet and is slightly rotated outward. As a result of the great development, well up on the anterior face, of the distal articulating facet the anterior face of this phalanx is concave. In the walking position this bone must have been almost perpendicular for when articulated it extended only a short distance below the distal end of metatarsal III. Phalanx 2, when naturally articulated, was almost at right angles to No. 1 and carried all the weight of digit II, phalanx 1 of this digit scarcely touching the ground. The lower part of the proximal articulating surface of phalanx 2 is continued backward as a long lip, making the lower surface of this bone much longer than the upper. This bone is slightly compressed superiorly and the distal end is deeply grooved. Phalanx 3 is much larger than the other unguals, is strongly curved and laterally compressed.

Digit II of the pes of this species has been very well illustrated and described by Lambe in *The Ottawa Naturalist* for May, 1904. Lambe regarded his specimen as pertaining to the manus of *Ornithomimus* (*Struthiomimus*) *altus* and described its grasping power.

Metatarsal III is the longest bone of the foot. It is not reduced in its proximal portion but is of about the same dimensions as Mts. II and IV except the distal end which is somewhat larger than in the others. The distal end is not as broad as in the Ornithomimidæ or Deinodontidæ. Phalanges 1 to 3 of digit III gradually decrease in length and thickness but not to the same extent as in *Struthiomimus*. Phalanges 1 and 2 are low and moderately broad and their distal articulations resemble those of *Struthiomimus*. Phalanx 3 is somewhat narrower and the distal facet is deeply grooved. Phalanx 4 resembles the ungual of digit II but is much smaller.

The phalanges of digit IV are proportionately longer than in *Struthiomimus* and shorter than in *Macrophalangia*. They are moderately broad and low. The ungual is smaller than that of digit III and slightly less curved.

MEASUREMENTS OF PES

Length of Mt. I	85 mm.
" " " II	210 mm.
" " " III	250 mm.
Length of Mt. IV	240 mm.
" " digit II (articulated)	125 mm.
" " " III	190 mm.
" " " IV "	150 mm.
" " ungual of digit.... II (tip restored) about.....	55 mm.
Height of " II proximally...	30 mm.
" " " III " ...	27 mm.
Greatest thickness of ungual of digit..... II.....	12 mm.
" " " III.....	12 mm.

CAUDAL VERTEBRAE

Pl. II. Fig. 4, 5, 6

Six partly complete distal caudal vertebrae are preserved with the specimen. The centra are long, slender and subrectangular in cross section. None of these vertebrae is hollow and the dense outer portion of the bone is quite thick. When viewed from the side (Pl. II, Fig. 4) the caudal centrum is quite flat-sided and concave below. On the inferior surface a well developed, longitudinal trench extends the whole length of the centrum (Pl. II, fig. 5). As they proceed forward and the bodies of the centra broaden this trench widens but is of about the same depth and the thickness of the side walls does not vary much. This trench or groove is of uniform depth and continues the whole length of the centrum shallowing only when the articulating face is reached. The articular ends are square or very slightly higher than broad. The anterior face is flat and the posterior face is flat or very slightly convex. The neural canal is circular and very small. In none of the vertebrae are the zygapophyses complete but they seem to have been strongly developed, especially the prezygapophyses, and the posterior caudals were probably interlocked by these prolongations.

The main movement in the posterior portion of the tail was probably an up and down movement as the interlocking of the zygapophyses would prevent freedom of action from side to side.

The structure of both the front and hind feet of *Stenonychosaurus* seems to suggest that it should be regarded as a direct descendant of *Ornitholestes* though the difference in the caudal vertebrae might be against this suggestion. The caudal vertebrae of *Ornitholestes* are given as amphicœlus while those of *Stenonychosaurus*, in the distal region at least, are amphiplatyan. More complete specimens of this Belly River form should assist greatly in determining its relationships.

SOME 1930 NOTES FROM LONDON, ONTARIO

By E. M. S. DALE

DURING the year 1930 many interesting records were made by The McIlwraith Ornithological Club, London, Ont., some of which are of sufficient general interest perhaps, to warrant their publication in *The Canadian Field-Naturalist*. Some of these occurred outside the County of Middlesex, which is the initial field of our endeavour, but all were located in Western Ontario, of which London might, perhaps, be termed the ornithological centre. Several were written up for *The Naturalist* before it became apparent that we were to have an epidemic of rare birds in our vicinity in 1930, so that these particular occurrences will be barely mentioned here, reference being made to the previously published account where fuller particulars may be obtained.

The first item of importance was finding a pair of Eastern Lark Sparrows (*Chondestes grammacus grammacus*) nesting half a mile south of Walsingham on May 24th. This has already been mentioned in the columns of *The Naturalist* (45: 21, 1931), and it will therefore be unnecessary to give details again.

While Mr. Calvert was discovering the Lark Sparrow, another party consisting of Mr. Eli Davis and the writer, visited Ipperwash Beach, Lake Huron, over the Victoria Day holiday, and found, in addition to other interesting waders, a flock of 80 Hudsonian Curlews (*Phæopus hudsonicus*). Perhaps a rarer find made on this trip was a Cormorant, presumably double-crested, (*Phalacrocorax auritus*) on the fish nets off shore, just opposite our camp. In 1929 five had been observed there on May 25th and it would appear that this might very well be a regular point of call for migrating Cormorants on the way to their northern breeding grounds. After reading Dr. Harrison F. Lewis' life history of these birds we may well speculate as to which colony the Ipperwash birds belong to.

Another bird found at Ipperwash was the Prairie Warbler (*Dendroica discolor*). It was, of course, known to be quite common in that district and therefore caused no particular comment. It was much more interesting, however, to find two singing males not far from Turkey Point on June 1st, as they had not previously been reported from that district, and also to hear one singing near Mt. Brydges on July 13th. The Prairie Warbler is one of the rarer Ontario warblers although in certain districts bordering Lake Huron and Georgian Bay it is locally common during the breeding season.

On June 14th and 15th Messrs. W. E. Saunders and T. D. Patterson of London, and Messrs. R. V. Lindsay and F. H. Emery of Toronto, went to Kent County to look for Henslow's Sparrow (*Passerherbulus henslowi*), and the Acadian Flycatcher (*Empidonax virescens*), the former having been previously found at Jeannette's Creek and the latter in Rondeau Park. Only one Henslow's Sparrow was discovered, the field where they lived having been ploughed up and time did not permit a very extended search to learn where they were now located. An Acadian Flycatcher was heard at Rondeau as was to be expected, but the high light of the expedition was the discovery of a Prothonotary Warbler (*Protonotaria citrea*). These two species, the Acadian and Prothonotary, have been written up for *The Naturalist* by Mr. W. E. Saunders, 45: 14, 1931

On June 26th Mr. A. A. Wood heard a Dickcissel (*Spiza americana*) singing near the Laboratory at Strathroy. He collected it the following morning, this being the first record for the county of Middlesex since 1895 when there was somewhat of a visitation of them in Ontario.

The writer spent a couple of weeks in July at the Y.M.C.A. camp at Silver Beach, three or four miles east of Port Bruce and while there found a couple of colonies of Henslow's Sparrows living in nearby fields, the colonies being about half a mile apart. The larger one must have contained a dozen or more pairs. The birds allowed us to approach within 15 or 20 feet as they sat on weed tops singing their odd and insignificant little song. Henslow's Sparrows are generally found in wet fields where the grass is long and rank, but although we were told that these fields were usually somewhat wet, the continued drought had caused them to become decidedly dry. The growth consisted of various grasses, asters, goldenrod, mullein, etc.

When news of this find was brought back to the city (London), an expedition was organized that others who were interested might see the birds also. We went on July 27th and on this occasion found as well a pair of Dickcissels close by Mr. Russell Glidden's house, the male singing continually from the tops of the apple trees in the orchard. We had felt sorry to think we had missed seeing in life the one taken by Mr. A. A. Wood at Strathroy, but Dame Fortune was kind and quick to make amends. This district was visited

in the succeeding week by Messrs. Lindsay and Emery of Toronto who saw both species, several specimens of Henslow's Sparrows being taken, while in August Mr. Emery again went down and succeeded in finding two nests.

It is always interesting to add a bird to one's life list but when this addition is also a new bird for the county, the pleasure is greatly increased. On August 2nd Mr. and Mrs. Eli Davis called for the writer and his wife to go to the country for a picnic supper and escape the city heat. When crossing Komoka bridge we stopped to scan the river and seeing a flock of birds half a mile up-stream that looked like waders, we drove back to hunt them up. All thought of the waders was lost, however, when Mrs. Dale espied a white heron standing in the river. It flew up-stream, turned and flew down-stream, alighting in a tree on the north side. We, that is the male members of the party, waded across but although the bird was too wary to allow as close an approach as we could have desired, we were able to make out quite easily the fact that it had yellowish green legs, the field mark of the juvenile Little Blue Heron (*Florida cærulea cærulea*). It was seen again the next day, practically all of the field men of the bird club journeying out to make its acquaintance. On August 9th three were seen together on the river below Byron, but the following week when we patrolled the stream from Byron to Delaware to find out how many there actually were (various reports having reached our ears from farmers along the way), we did not succeed in finding any at all, much to our disappointment.

During July and August of this same year (1930) White Herons (either *Florida cærulea cærulea* or *Herodia egretta*) were also reported from Brussels, Niagara, Port Bruce, Essex, Port Rowan, Galt and West Lorne. Indications are that the Port Bruce bird was an immature Little Blue, while the West Lorne bird was an Egret.

The latter was reported to us by Mr. V. Earl Lemon, a correspondent at that place, and members of the London bird club went down to see it on September 2nd and 3rd. In addition to this we had a visit from one at London, a large white bird on a pond a mile south of the city proving to be an Egret when we went out on the morning of September 27th to investigate. It was rather a cool morning and the bird was standing by the edge of the water all huddled up. We approached too closely, however, and it at once assumed a much more life-like attitude, finally winging its way across to the other side of the pond. This is the first definite record for this species for Middlesex county since August 19th, 1882, when an immature specimen was shot by Mr. W. E Saunders near Middlemiss.

When we added the Little Blue Heron to the county list on August 2nd we did not think that in less than two weeks it would be followed by another new species.

On August 15th Mr. C. G. Watson and the writer visited a small but very attractive pool on the 2nd Concession of Westminster, just west of the Wellington Road to see what might be there in the way of waders. Considerable mud had been exposed by the dry weather and there was a small but nicely assorted flock of birds present including one that we were unable to name. We finally decided it was a Stilt Sandpiper (*Micropalama himantopus*) but being entirely unfamiliar with that species we noted it very carefully so that we could reach a final decision when we returned home and referred to plates and descriptions. These left no doubt that our surmise had been correct and as the bird was accommodating enough to remain over until the next day others of the bird club were enabled to see it also. It is fortunate indeed that so many other species were present—Lesser Yellowlegs, Killdeer, Solitary Sandpiper, Pectoral Sandpiper, etc.—with which to compare it for size and colour, as, had it been alone, it would have no doubt been passed by for a Lesser Yellowlegs, a species which it closely resembles. Later on another was found at a pool a mile south of Denfield, the date being September 1st.

On our way to the Bird Club corn roast on September 20th we thought we would drive round by way of the Denfield pool to see what might be there. As we neared it we saw a small sandpiper swimming about that we at once knew was a Phalarope. The next question was to determine which species. It paid no attention to the motor car so we remained in it and made careful notes of the various markings, which on comparison with books and specimens left no doubt that it was a Northern Phalarope (*Lobipes lobatus*). This was the second record of this bird for the county, the previous one being prior to 1882, when two birds were taken by Mr. Adam Coulter in a pool in the spruce swamp three miles west of London. After completing the identification we journeyed out to the picnic which we nearly ruined when we announced our find. Many left at once for Denfield and were successful in finding the bird. Others went out the next morning, but it was then too late as the Phalarope had moved on during the night.

Around London the Black-crowned Night Heron (*Nycticorax nævius nævius*) is both rare and irregular. It is sometimes noted in May or

June and also occasionally in the late summer or early fall. On August 11th, 1930, an adult was found along the river below Byron, and on subsequent visits to the locality two adults and two, if not three, young were seen, strong but not conclusive evidence that they had nested there. If so, it is not greatly to our credit that they remained undiscovered until August 11th, although the district, while visited frequently during the winter and early spring, is one that is seldom touched after the first of May when other places are usually more attractive.

The other records which follow are perhaps of more local than general interest but we take the liberty of appending a brief note on each herewith.

Bald Eagle (*Haliæetus leucocephalus leucocephalus*). Single birds and pairs, some adults and others immature, were seen during March and April, the largest number benig three, all adult, near Komoka Bridge, March 16th.

Whistling Swan (*Olor columbianus*). For several years past Swans have been reported on a number of occasions both spring and fall. The spring flight in 1930 occurred April 2nd to 6th. One flock of 150 was observed, also several smaller ones, while a single bird stayed for two days on a pond a mile south of the ctiy.

A Duck Hawk (*Falco peregrinus anatum*) was seen on April 5th near Komoka, the first record for Middlesex county in many years.

The Yellow-breasted Chat (*Icteria virens virens*) is a somewhat iregular visitor, being recorded about once in every two or three years. We got one in 1930 on May 16th in the "Goldenwing" woods, the place where visiting Chats are almost invariably found. It remained for several days and was heard and seen by many of the members of the club.

Another rare bird for the immediate vicinity of London was the Sanderling (*Calidris leucophæa*) found at the Denfield pool on September 1st. It was, indeed, the first record for the county for the species, although it is common enough in adjacent counties which border Lake Huron or Lake Erie. Being fond of long stretches of open beach it does not find conditions to its liking in Middlesex county which is strictly inland.

It will no doubt be some time before we shall again, in one year, add three new birds to the county records and in addition see such an interesting list of rare species in our neighbourhood.

*THE SAVING OF VANISHING DATA**

By RALPH T. KING

THIS TITLE is admittedly stolen from an article written twenty-eight years ago by Alfred C. Haddon, F.R.S., and published in *Popular Science Monthly*, January, 1903. Mr. Haddon begins his article with the following statements: "As the business man finds it necessary to go over his stock periodically and to balance his books, so, also, the scientific man, especially the biologist, should perform an analogous operation, lest perchance he finds out too late that he has been entering on a comparatively non-profitable work, or has been neglecting valuable opportunities. While it is impossible to say that any scientific work will be ultimately unprofitable, it is right to point out that particular objects for investigation may be of more immediate importance than others. We can, perhaps, gain a clear view of the question by looking at it from the standpoint of our successors. What will be the opinion of the naturalist of a hundred, or of a thousand years hence of the work now being done? What is the scientific work he would wish us to have undertaken? This question is not a difficult one to answer."

"He would not consider it very necessary for us to elucidate the structure, development or physiology of every common animal; these researches can be pursued at any time. The investigation of the life in the oceans—whether on the surface, in shallow water, or in abysmal depths—can be done by him as well as by us. The naturalist of the future will certainly and most justly complain if we busy ourselves entirely with problems that can wait, which he can solve as well as we, and at the same time neglect that work which we alone can do. Our first and immediate duty is to save for science those data that are vanishing; this should be the watchword of the present day."

If this was true at the beginning of the century, how much more true is it now with the century almost a third gone?

This present article is prompted by a knowledge, gained from experience, of the necessity for securing certain data relative to wild life conditions while those data are still obtainable. It is an accepted truth that there can be no real

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understanding and consequently no logical treatment of an abnormal condition until the normal is known and understood. Inasmuch as any deviation from the normal constitutes an abnormal condition we are justified in assuming that much of our wild life to-day is existing under abnormal conditions. Certainly our management measures and administrative practices could be better formulated and applied if we knew more of the normal conditions of existence for the species thus affected.

How are we to obtain this knowledge of normal conditions? In the case of some species it is still possible to investigate them under normal natural conditions. Investigations of such species should be undertaken at once and carried as far as possible before continued industrial and agricultural development modifies or destroys these, as yet, undisturbed environments.

There is, however, a considerable number of species that exist now only as they have become more or less adapted to meet the conditions of a changed environment. This group can never be investigated in their original (*i.e.* normal) habitat. Our only recourse in this case is to procure from every possible source all the data bearing on these species at this earlier time, to compile and evaluate these data and then draw such conclusions as are warranted relative to their behaviour under normal conditions.

The necessity for gathering together and preserving these data bearing on past conditions can perhaps be best illustrated by reference to current studies of game cycles. These cycles, or periodic fluctuations in numbers, are conspicuous and important phenomena exhibited by a number of species and occur over a large part of the world. Such fluctuations are commonly referred to as cyclic behaviour. There isn't complete agreement yet as to just what constitutes cyclic behaviour; some investigators insist that only regular and rhythmic fluctuations are entitled to inclusion under the term, whereas others would include any type of fluctuation no matter how irregular. This, however, is purely a question of definition, and has little bearing on the matter under discussion.

Ruffed grouse and snowshoe rabbits exhibit these fluctuations as well or better than any other game species, while cottontail and jack rabbits, pinnated, sharp-tailed and spruce grouse are known to show the same type of behaviour to a marked degree. Both Seton and Hewitt have pointed out the large number of fur and game species either primarily or secondarily affected by these fluctuations in Canada. Elton is now carrying on investigations of these same phenomen in the far north, and Middleton has recently called attention to indications of beginning cyclic behaviour in the introduced American gray squirrel in England. This same behaviour has long been known to characterise lemming and mouse populations in various parts of the world.

It is obvious that any investigations of these various species must take into account this marked characteristic of the species' population behaviour. In fact, it seems that any study of these species might well be built up around what appears to be a most important and fundamental rule of their existence.

If this is true the first problem confronting us is one of method. How can we most quickly obtain the greatest amount of knowledge relative to these fluctuations? The question as to what we will do with the information when we have finally compiled it can be postponed for the moment. It is difficult, if not impossible, to plan the use of material before the nature of that material is known.

If we are to begin our study of cycles in 1930 and carry it forward, making observations and collecting data only as the future behaviour of the species under investigation permits, we will not be in a position to draw sound conclusions for at least another generation. Cycles in the various species and in different parts of the country vary in length from six to ten or more years. Accepting even the lowest of these figures and carrying out future investigations on that basis it would require a period of thirty years to compile data on five peaks and five depressions. Even though sufficient data could be obtained in this short period it would remove the solution of our problem to 1960.

It would seem that any method promising earlier solution, or even temporary aid while awaiting future developments, is well worth trying out.

We believe a method involving a collection, compilation and evaluation of data bearing on the past occurrence and behaviour of these species would constitute a most valuable contribution to the work in conservation and management. Mr. P. A. Taverner writing in *The Canadian Field-Naturalist* has said: "Of late, considerable interest has been taken in the periodic fluctuation in numbers of rodents and grouse and I have received several requests for information on the subject. It is being realized that these cyclic variations are more than local and have a deep bearing upon important economic questions. The data upon past variations are scattered and fragmentary and difficult to gather together for correlation. Much of them are unpublished and exist only in old note-books or

in fading memories, unattainable to research students. It would be well if all who can add to the history of such events would publish them. . ."

Any study of a given species will require years to collect and record a mass of data regarding that species that will equal in amount and scope the number of observations already made but unrecorded. This is true because, first, few if any species now occur in as large numbers or over as great an area as they did formerly. Consequently opportunities for making observations are more limited than formerly. Second, certain species are cyclic, that is, individuals of such species are present in large numbers for one or more years and then for an even longer period they occur in only limited numbers. Work on such species is held up to a considerable extent during these low periods for lack of material to work on. Third, the number of observations made in any one year or short period of years can not possibly equal the number of observations made by all the interested parties for years past. Fourth, various species were formerly present in localities and under conditions where they no longer exist. There are undoubtedly data bearing on their occurrence and behaviour in such places and under such conditions which can not now be duplicated. Fifth, there are men, trained woodsmen, with a keen interest in these matters, who claim no scientific training and no knowledge of technical methods whose ability to observe and interpret field conditions are the despair of the technically trained naturalist. If we fail to make use of the vast fund of information stored in the memories of these men through a life-time association with the actual conditions we are overlooking one of the very best sources of knowledge and delaying our work accordingly. Incidentally most of this information is not recorded and unless we get it into the literature soon it will be gone forever.

In this connection Elton in his book "Animal Ecology" has very aptly said: "It should always be remembered that the professional ecologist has to rely, and always will have to rely, for a great many of his data, upon the observations of men like fishermen, game keepers, local naturalists, and in fact, all manner of people who are not professional scientists at all. The life, habits, and distribution of animals are often such difficult things to ascertain and so variable from time to time, that it will always be absolutely essential to use the unique knowledge of men who have been studying animals in one place for a good many years. It is a comparatively simple matter to make a preliminary biological survey and accumulate lists of the animals in different communities. This preliminary work requires, of course, great energy and perseverance, and a skilled acquainatnce with the ways of animals; but it is when one penetrates into the more intimate problems of animal life, and attempts to construct the food-cycles that the immensity of the task begins to appear and the difficulty of obtaining the right class of data is discovered. It is therefore worth emphazising the vital importance of keeping in touch with all practical men who spend much of their lives among wild animals. The writer has learned a far greater number of interesting and invaluable ecological facts about the social organization of animals from gamekeepers and private naturalists, and from the writings of men like W. H. Hudson, than from trained zoologists. There is something to be said for the view of an anonymous wrtier in *Nature*, who wrote: "The notion that the truth can be sought in books is still widely prevalent and the present dearth of illiterate men constitutes a serious menace to the advancement of knowledge."

The two most frequent criticisms directed toward data obtained in this way are, first, it is not scientific, presumably only because the original observers were not professional scientists, and second, it is inaccurate because much of it has existed for years only in the memories of the observers. We do not believe this first criticism is a valid one. Published scientific material is, in final analysis, the results of observation and experience of the various interested individuals. Failure to publish doesn't necessarily signify lack of scientific value. Most of the men possessing the kind of information we are here considering have had no opportunity or encouragement to publish or even record their observations. Many of them, in fact, have little knowledge of publications and could not prepare an article if they would. This is not an unmitigated evil. The very circumstances that have operated to keep them unaware of the experiences and opinions of others have also insured the preservation of their data uninfluenced by hastily constructed hypotheses and questionable theories based on too little investigation.

The writer is prone to believe that most of this criticism comes from those biologists who have had least experience in the field. The laboratory worker has grown accustomed to carrying on his own experiments under controlled conditions and repeating them any number of times. The field worker has quite frequently to make use of experiments inaugurated by some force other than man's, he seldom has the advantage of controls, and he can look for a repetition of his experi-

ments only a few times if at all during his lifetime. The same conditions have, however, existed at various times and are frequently repeated in different places. Aren't we justifiably near the truth in accepting the observations of a thousand observers made at different times in different places in lieu of the laboratory workers' thousand observations on the one oft-repeated experiment?

Every field investigator makes use of information supplied by local residents as to present conditions. Isn't information from the same source as to past conditions of equal value? The only valid criticism to be brought against it is that its truth is dependent on the informer's memory. Men interested in and dependent upon wild life for their livelihood are just as much impressed by the changing status of wild life as are other individuals in other lines of industry when changes affect those industries.

In fact, these men concerned with wild life have been, in most cases, so long dependent on their own resources that they have developed memories admirably adapted for storing and recalling the information so necessary in their daily activities.

The sources of this information are guides, game wardens, trappers, fishermen, local naturalists, market hunters of the old days, old settlers, in fact, any "old timer" who has had any connection or interest in wild life. Those individuals of this type who possess the largest fund of worthwhile knowledge are truly "old timers" with but few years left them at most. In this group are the old market hunters whose knowledge of the habits and distribution of game enabled them to support themselves and their families. They and their contemporaries knew wild life under very nearly, if not actually, normal conditions. There is little time in which to record their impressions. Few of them will do it of their own accord. Only by a real and conscious effort can we secure and preserve these vanishing data.

Individual students of wild life have for a long time been observing facts but in altogether too many instances publishing and discussing opinions. It is true that each man is entitled to his own opinion, but it is equally true that an opinion formed on the basis of a thousand observations is of more value than one formed on the basis of a single observation. This historical study should attempt to get together all the facts that may prove of value in providing a sound basis for drawing conclusions. Conclusions drawn by different individuals differ in value. Facts, however, are of only two types—complete and incomplete. Even incomplete facts are better than none at all.

It doesn't matter to us at this stage who will draw the conclusions from the collected facts. Every science develops its Darwin, its one great generalizer. Such a man will appear, if he is not already present, among wild life investigators when the time is ripe. Our duty is to record these data now before they are gone forever.

Our arguments may be summed up as follows: First, there is need for data on past conditions; second, such data are rapidly becoming unavailable and third, only men actually acquainted with field conditions over a considerable period of years in one locality are qualified to give such data.

In conclusion I would like to mention one additional point in language paraphrased from Haddon's article quoted earlier in this paper. In most branches of scientific enquiry, later investigations, owing to more minute study, improved methods, or a new point of view, are apt to eclipse the earlier investigations. This is not the case with research in this field. The earlier the observations the more apt they are to be of greater importance than later ones. Students continually refer to the older books, and they will always do so. From this point of view it is evident that properly qualified investigators should set to work without delay. Every year's delay means that the work will be so much the less perfect. All who are concerned in field work of this type can have the satisfaction of feeling that students of the future will have to consult their publications, and they have the tremendous responsibility that what they write will have to be accepted as correct as there will be no means in the future of checking it.

CHANGE OF NAME OF A FOSSIL BRACHIOPOD—In a paper entitled "The Kiln Shale Fauna" (Bulletin of the Museum of Comparative Zoology, Vol. LXXII, No. 5, p. 197, Nov., 1931) I gave the name *athabascense* to a new species of *Leiorhynchus*.

Dr. E. M. Kindle kindly called to my attention to the fact that he had already used this name for a new species of *Leiorhynchus* ("Three new Devonic fossils from Alberta", Pan-American Geologist, Vol. 42, No. 3, pp. 217-218, Oct. 1924).

I propose to change the name of my species, calling it *Leiorhynchus jasperense*.—C. H. BURGESS.

CONTRIBUTIONS TO THE KNOWLEDGE OF EXTREME NORTH-EASTERN LABRADOR

By BERNHARD HANTZSCH

TRANSLATED BY M. B. A. ANDERSON

"Beiträge zur Kenntnis des nordöstlichsten Labradors," von Bernhard Hantzsch, *Mitteilungen des Vereins für Erdkunde zu Dresden*. Dresden, Volume 8, 1909, pp. 158-229; Volume 9, 1909, pp. 245-320.

(Translated from the original German text in the Library of Congress, Washington, D.C., by M. B. A. Anderson, M.A., Ottawa, 1928.)

Original pagination given in the text

(*Continued from Page 89*)

The independence of the growing youth thrives with increasing ability. Their age is not reckoned. In most cases there is an insufficient numerical system. The ambition of the young man is now directed towards owning the necessary fishing and hunting gear, a kayak, etc. If his father is still alive and an industrious hunter, this is not too difficult for the son; otherwise he does not get on in the world so easily. If he can at last look after his own support, if he has not too many duties toward his mother and brothers and sisters and is developed physically and mentally enough, then no special difficulties are put in his way to establish a new household. For a long time he has known all about the few growing girls in the vicinity. At times even the parents and relatives have allotted both parties to each other when children.

The capacity of the girls for marriage does not depend upon a certain age, but their physical development and their domestic ability. They flirt with each other in a rather uncouth way [P. 289] and then at last without much ceremony the union is consummated. Until a few years ago the young man had to give the father of the girl rather valuable articles, in order to become a fully authorized married man, that is, a large number of skins, hunting gear, dogs, or other things. This custom, which has now been stopped had as a consequence the fact that fathers who were avaricious or in great poverty occasionally sold their daughters when they were too young. Mrs. Lane in Killinek told me of a case, where a man had acquired a child, about six years old, and she had died as a result of the treatment she had received. Among these people of nature there thus occur unnatural crimes, without a punishing hand to avenge innocence. In this respect, however, the Eskimos are already known. (Compare O. Peschel, *Völkerkunde*, Leipzig, 1885, p. 420.) As a rule the girls marry at the age of 15-20 years, the men from 17-25 years, but they have often made the more intimate acquaintance of the other sex beforehand. The sensuality of the people is great, and of all the transgressions which the missionaries at the mission stations have to reprove, those against the sixth commandment are by far the most frequent. I shall not enter into any discussion for and against. From an anthropological standpoint the circumstances may of course be defended. In general unguarded young people seem to unite, as soon as desire and capacity become strong enough. Usually there are no consequences immediately, and even if there are, they are married sooner or later. Illegitimate children are no disgrace among the heathen, but do not seem to occur frequently, because the girls as a rule soon find a husband. Mothers of 13-14 years, who have not yet attained their own growth, are said to occur once in a while. With their strongly moral viewpoint which, however, is not free of prejudice, the missionaries preach zealously against the immorality of youth. But in the confined life they lead together, the slight feeling of modesty toward each other, with their susceptible nature and the lack of idealistic, mental occupations, it is difficult to educate the people to chastity beyond a certain degree.

The early motherhood of a girl not yet fully developed is said to cause no disgrace and it is claimed even makes childbirth easier. No educated white man, however, possesses exact knowledge concerning the love life of the population, the missionaries least of all. He would have to enter completely into the life of the people, and should not feel above them, in order to study these most intimate relations. In the presence of strangers the people are reserved and decorous toward one another. Only by chance do you obtain information concerning their relations with one another.

The contract of marriage ensues as a rule from exterior motives. The division of work between the sexes makes life together a necessity, but it incites each party to a vigorous development of the knowledge and skill required of him. Only a married person has the reputation of being of full value; for a clever, industrious girl soon finds a husband, a valiant hunter and fisherman soon finds a wife. Unmarried older persons are incompetent people, and are looked down upon as such. Spiritual affection between married people does not exist as a rule. Here is to be seen the

superficiality of the Eskimo character. Unselfish love, unchanging loyalty, are not known. When now and then scenes of jealous rivalry occur among the men, the reason is in sensual passion, especially when there is a shortage of women. The Eskimo is quite reasonable and practical, even animal-like, even if he displays a slight degree of feeling in all other relations of life. This makes it so difficult for the missionaries to exert any lasting influence on soul and will. The female sex does not have a low standing at all, as is the case with so many tropical peoples. Wise old women know how to gain for themselves real independence and high regard in family and community, but young married men are said to be brutal and frequently violent, and to strike their wives oftener than their children. If she has parents or brothers, then she does not permit this to happen too frequently, but some day leaves secretly in order to seek refuge with her relatives. [P. 291]. In such a case she takes perhaps an infant and usually any daughters also, while she leaves the boys with the father. The pair are often soon reconciled. But if a quarrel breaks forth again they separate anew. My somewhat stubborn companion, Paksau, had an independent wife of the same disposition, who was living with her relatives at Auklatsivik at the time of my stay in Killinek. The incompatible pair had already separated several times, and had been reconciled again. But this time Paksau showed no inclination of yielding; for when we were at New Plauen and I asked him to sail over to Auklatsivik with me, he refused with grim laughter. He was living in Killinek with his half-sister, who was very kind to him. Since the woman was baptized in Rama as a Christian, the missionary, Mr. Waldmann, would not permit their living together, and threatened to banish Paksau from the station, if he did not fetch back his rightful wife and send away his sister. The people told me that they were all related to one another, and did not always know who was their true father. Exchange of wives and other customs seem to have been the order of the day until recently. For example the housewife is said to have been regularly given to the strange guest and the missionary, Mr. Perrett, told me a story of how one of the wisest of the Killinek men, who could even read a little, told him that he no longer had any desire to give his wife always to the overnight guests. Marriage is as a rule monogamous. With the looseness of the marriage tie this mode of action may be the best, because the individual number of the sexes in general is about the same. Moreover it is difficult for the man to provide more than one wife along with their children with food and clothing, especially as too much work is not popular. It is said there have been industrious hunters, who owned two or even more wives, especially at a time when the first wife aged more quickly than the husband. But after the introduction of the activity of the missions in the district the days of allowed polygamy are numbered. In 1906 only the oldest man in the community had two wives, who [P. 292] because he had become half blind and feeble, had to do more for his support, than he did for theirs. The restraint of Christian moral commands may be broken more in secret at present, especially by widowed persons, and persons whose other married half is incapable of sexual intercourse because of illness or other circumstances; the worst consequence of such conduct occur through abortions, purposely caused in order to keep the missionaries in ignorance of these affairs. It can hardly be doubted that the population is approaching its decline more quickly because of the artificially limited intercourse of the sexes.

The members of the rather limited relationship usually stay together, and live fairly near each other, even in the same tent or house. They then often use larger possessions not needed for personal use in common, but the oldest man has a sort of deciding voice and chief claim. If, for example, a strange traveller has received services from a group of Eskimos or bought articles from them, then the payment is usually made to the head of the family, who according to his opinion of their worth then pays the other individual men. They also share with one another when hunting and trapping. This proceeding is practical for each person, because the results of the hunt are not always to be depended on even if all cleverness is employed. It incites the activity of efficient people to care zealously for the common good and thereby win prestige among their associates, but indeed at times it promotes laziness and wastefulness on the part of some people, who know, of course, that in the end they will be provided with clothing, food and a dwelling. An awkward and lazy person is of course looked down upon and often is treated badly, but he is not easily allowed to perish entirely. The single family preserves a certain independence in spite of the closely united way of living of the relationship. Every married woman cares for her own oil lamp if possible, and prepares the food for her own family. For instance it made quite an impression on me, when I was sitting in the evening with three or four families in the large tent and the wife of the eldest man [P. 293] was the first to light a wood fire perhaps in order to bake a flour cake in the pan. When she had

finished with this in ten or fifteen minutes and placed it in a corner of the tent, the second wife began the same work, etc. Worthy married men will also perform such work in place of their wives in case these are busy with their infants or otherwise engaged. In spite of the division of work the men are somewhat experienced in woman's work, since they have to look after themselves alone on hunting trips, often for a long time. Besides, they still know how to start a fire by the quick turning of a pointed stick of soft wood in the cavity of a piece of hard wood and starting plant-cotton or fine dry moss to burning. Usually though, they use the matches distributed by trade quite generally, of which many are used, especially for the lighting of tobacco pipes.

After the joys and work of the day they go to their rest at an indefinite hour in the evening and also not always at the same time. They usually take off all their clothing, and hang it up, if it is damp, or if not damp, use it for a pillow, especially in cramped quarters. As already remarked, the high platform covered with caribou skins, in the back part of the room serves as a bed. The mother takes the infants to her breast; larger children and the father find a narrow place at her side. They cover themselves with caribou skins, which are in many cases sewed together. So they all sleep peacefully near one another, their heads turned toward the entrance, often so crowded that they can hardly turn round. But this disturbs them little in their peaceful sleep. Larger boys often have a special sleeping place at the side of the living room, perhaps in order that they may not so easily disturb the peace and order of the house. Strange guests are very often accommodated in this way. Taking off all their clothing and covering themselves merely with skins has the consequence that the sleepers may be cold in severe cold weather. Therefore if possible the oil lamp is allowed [P. 294] to burn during the night, and it is the duty of the housewife to wake up occasionally, to reach out towards the lamp which is placed not far from her head, to clean the moss wick with a small piece of wood or bone lying near and to trim it right and thus contribute light and warmth in the sleeping room. They like the darkness still less than the cold, for which reason only in times of want do they deny themselves the comfort of primitive lighting and heating. If a bear or other creature is lured thither by the glow of the light, and wishes to pay the inhabitants a visit, then the dogs outside raise a great racket and prevent unwelcome surprises. It is plain to be seen, that the air in the inside of the sleeping room, especially in winter, assumes a character that is not inviting to our noses. As long as the people still live in the tent, sufficient ventilation is provided by the wind blowing in from outside. When the tent entrance has been closed loosely, I have seen people lying in sleep half-uncovered, while the wind blew across them and covered them with fine snow dust. This manner of sleeping used mostly by the Killinek people at the present time, looked at from the natural standpoint, has many advantages. It makes possible the perspiration of the body, hardens the body through contact with the air, grants the greatest utilization of the cramped sleeping room and in addition affords the advantage of mutual warmth in lying close to one another. It has indeed often been proved by Arctic travellers, that sufficient warmth for the body is developed only by lying close beside one another in an unclothed state during severe cold weather without. One may be convinced that the century old customs of the Eskimo population represent the result of experiences suitable for those cold regions. To be sure the Christian missionaries perceive in this manner of spending the night a great temptation to actions, which considered from our rules of conduct are immoral, and therefore try to accustom their members to greater modesty and reserve. As a result I observed in the case of some of the especially "moral" Eskimos that they [P. 295] did not undress at all, but lay down to sleep in all their clothing, a thing which is in no way advisable from a hygienic viewpoint. I thought then of my stay in Iceland, considered as Christian and quite educated, when I had lived repeatedly in peasant houses away from the main road, in which in the evening the family with the servants undressed in the common room, and as many as six persons lay down in the same bed. In both districts, so different as to population, the same reasons may have led to quite similar arrangements. If the missionaries were at the same time physicians or naturalists, they would perhaps be of a different opinion about the morality or immorality of the natives. The feeling of embarrassment towards one another must be dulled, when at times the severe cold of winter makes even the most private functions impossible outside of the common living room.

If illness breaks out in the family the cure is usually left to nature, if there are no white people near at hand whose advice can be asked for. The sick man rests and is hungry, if conditions are such that he has to stay away from his work. It is often very hard for the little children when the mother is not able to put them to bed and care for them at home, but often is compelled to carry

them about in her hood even if very ill. The only child in the community which had been baptized in a Christian manner, a girl of about two years, died in my arms, after its mother had brought it in the severe cold half dead into the mission house. The legs and lower part of the body were cold already, the eyes dim; the last rattling breath showed the condition the child was in clearly enough. Adult persons, who are lying down in the house, are cared for as well as possible, without anyone troubling himself in particular about them; they act from duty and custom, but far removed from any sentiment. However abundantly they use the more or less suitable remedies from the missionaries they do not yet understand how to make use of the native products as medicines except in a slight measure. In long and severe illnesses they often try to help by sorcery, a custom which is indeed on the decline on account of the teachings of the missionaries. I could not learn much concerning the methods used since the people were too shy to give any information about it. Persons of both sexes practice such magic, especially old women. Such exciting scenes as are carried on by the sorcerers (*Angakok*, plural *Angakut*) of other heathen Eskimo bands for the last six or eight years have apparently not occurred in these districts. Incantation against sickness consists, at present, merely of an endless chanting of monotonous songs and occasionally of theatrical performances on the part of the Angakok. With these some magic objects, such as skulls of animals, bones, amulets, play a part and occasionally direct influences on the body of the sick man, such as massages and movements of the limbs are practiced. Imagination, superstition, and the mysteriousness of the affair, perhaps even direct hypnotic suggestion may now and then influence the course of the sickness favourably. The persons who have a reputation for sorcery are known in part to the whites. The mother of my companion, Paksau, had a reputation as a successful healer, but she was reticent and afraid, and I could learn nothing from her. I had only once the opportunity of being present at an incantation which was conducted quietly and carried on as Christianity. One evening I visited the three tents of five married brothers from Ablorilik, intelligent men and instructed in Christianity. While I sat by the fire with six or eight persons, I was called suddenly into the neighbouring tent, where the youngest of the brothers rested on the bed as pale as a corpse. As I then ascertained, he was suffering apparently from cramps of the heart, this time so bad that they feared his death. I did not know anything to do for such a bad case and with lack of any medical knowledge and remedies except to regulate the circulation of the blood by simple massage and applications. Still more did I hope that my actions with the sick man would quiet him and would influence him favourably thereby. While I knelt on the caribou skins near the young man, whose wife had already gone to rest, [P. 297] and lay there most of the time rather indifferent, so that I had to motion to her to move somewhat to the side, the other adults assembled whispering in the tent. The oldest of the brothers, who could read a little and had received a New Testament from the missionary, Mr. Waldman, sat down near me and began to read aloud a passage, which had been underlined for such purposes. He repeated the verse countless times, while the others present frequently spoke the last words after him in a chorus. This lasted for about an hour. If I had not seen the book, I should have believed I was present at a heathen incantation, and I am of the opinion that it was not much else. When at last the sufferer breathed quietly again, his heart action became regular, and he spoke quietly and peacefully, I arose to go home, whereupon the sitting was broken up generally and they prepared to go to sleep. Resigned calm toward such trials of life seldom deserts these people. I did not see a look of real concern or sympathy, even when the only child of a young mother died; her face was as sad and troubled as I had ever seen an Eskimo countenance before, but not a tear came to her eyes. Scarcely had the child given its last sigh, when she brought water and soap, washed its whole body, as if she were handling something living, and then the affair was apparently finished for her. After a few days her round face was beaming as before. But when sometime later we sat opposite one another in a boat, and our glances met, she suddenly became serious; we were both thinking of the young thing, that had had to die so soon.

As quickly as possible a dead person is taken outside. After the body becomes cold they do not like to come in contact with it. There seem to be no special ceremonies at the present time in the case of deaths. The tent, in which the death occurred is usually taken down, in order to put it up again elsewhere; a snowhouse is deserted entirely. In a wood or sod house on the other hand it is usually considered enough to give it a thorough airing. [P. 298] At the present time the missionaries care for burial in a Christian manner near the mission station. A place which has enough deep earth for the purpose is located a few minutes walk above the mission building. In 1906 there were just three graves in this little cemetery. In the winter the dead are occasion-

ally concealed temporarily in the snow or put in a snow-house for protection from animals. The old heathen custom, which is still followed on journeys, is in short the following. They place the dead, fully clothed or sewed in skins, on a level place near the sea, but so high, that the high tide cannot reach it. Now they erect about it a stone wall, which is covered over at the top with large stone slabs. The mound which arises does not touch the body lying at full length. Often at the foot of the grave, occasionally at the side of it, they erect an additional grave, which is meant for the reception of the smaller possessions of the deceased. The larger possessions are placed nearby, but at the present time the Eskimos keep most of these themselves. Often the old stone graves are disturbed by people, animals, or the influence of the weather, so that it is difficult to find a well preserved skeleton or interesting material.[34]

(To be continued)

[34] For lack of space I omit more detailed accounts here, since in the transactions and reports of the Royal Zoological and Anthropoligical-Ethnographical Museum at Dresden, Volume XII, 1908, pp. 55-58, I have given more detailed notes concerning the heathen burial customs and the report on anthropological collections in north-eastern Labrador on the basis of perhaps forty graves examined by me, and of the material which is now in the above-mentioned Museum. Two illustrations produced from my photographs of well-preserved stone graves are published with the article. (Cf. "Eskimo Stone Graves in North-Eastern Labrador and the Collection of Anthropological Material from Them." Translated by M. B. A. Anderson from "Uber Eskimo-Steingräber in nordöstlichen Labrador und das Sammeln anthropologischen Materials aus solchen," *Abhandlun gen und Berichte des Kgl. Zoologischen und Anthropologisch-Ethnographischen Museums zu Dresden, Dresden, Volume XII, 1908, pp. 55-58. The Canadian Field-Naturalist,* 44:11, 1930.].

EXCURSIONS OF
The Ottawa Field-Naturalists' Club, 1932

Do not collect any specimens except for scientific purposes.

It is the aim of the Club to foster the study of all branches of natural history on these excursions. On every occasion, groups will be formed to study botany, birds, insect life, geology, minerals, pond life, general zoology, etc. At the commencement of the excursion, particular items of interest peculiar to the locality will be explained, so that members and visitors will have an opportunity of devoting special attention to particular subjects when desirous of doing so alternatively to general natural history. Leaders will be provided for as many groups as occasion demands.

MAY 7—McKay Lake and vicinity. Take Rockcliffe O.E.R. car, and meet at terminus at 3 p.m.
LEADERS—Dr. E. M. Kindle, Mr. Hoyes Lloyd and others.

MAY 14—Britannia-on-the-Bay. Meet at the O.E.R. terminus at Britannia at 3 p.m.
LEADERS—Mr. Herbert Groh, Miss M. E. Cowan and others.

MAY 21—Fairy Lake vicinity. Take Hull Electric Railway car at Chateau Laurier for Wrightville at 2.30 p.m.
LEADERS—Dr. Ralph De Lury, Mr. C. E. Johnson and others.

MAY 28—Val Tetreau. Take Hull Electric Railway car at Chateau Laurier at 2.30 p.m. for Val Tetreau, and meet at Monument, bottom of Main Street.
LEADERS—Dr. F. J. Alcock, Mr. G. A. Miller and others.

JUNE 4—National Museum of Canada. By invitation of the Director, Dr. W. H. Collins. Meet at entrance at 3 p.m.

JUNE 11—Dominion Experimental Farm. By invitation of the Director, Dr. E. S. Archibald. Meet by the Observatory, Carling Ave. entrance, at 3 p.m.

JUNE 18—Rockcliffe Annex. Meet at Post Office, Ottawa, at 3 p.m. Take Eastview bus to terminus on Montreal Road.
LEADERS—Mr. B. A. Fauvel, Mr. Hoyes Lloyd and others.

JUNE 25—Heron Road and Rideau River. Meet on Billings Bridge at 3 p.m.
LEADERS—Mr. B. A. Fauvel, Dr. R. T. D. Wickenden and others.

SEPTEMBER—Four meetings will be held in the Kingsmere area. Details will be announced in the September number of *The Canadian Field-Naturalist.*

F. J. FRASER, *Convener* :: :: :: :: :: Phone—Office, Q. 2742, Local 8

ANNOUNCEMENT

It has always been the aim of the Ottawa Field-Naturalists' Club to keep in close touch with its members by striving to answer their questions on Natural History subjects.

In order to centralize and co-ordinate this service the Club is inaugurating an

INFORMATION SERVICE

which will undertake to answer questions on all branches of Natural History, and to identify specimens.

The service is open to all subscribers to *The Canadian Field-Naturalist*. Questions will be answered by competent authorities in each branch. Answers will be given by correspondence and questions of general interest will be discussed at length in *The Canadian Field-Naturalist*. Address questions or write for further details to

INFORMATION SERVICE
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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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VOL. XLVI OTTAWA, CANADA, SEPTEMBER, 1932 No. 6

THE BIRDS OF OTTAWA—ADDENDA

By HOYES LLOYD

SINCE the publication of "The Birds of Ottawa," 1923,[1] and addenda to October 2, 1924,[2] a number of years have passed, and it seems desirable to gather the bird records of the interval, published and unpublished, into one summary so far as possible. The casual way in which interesting bird observations and rare occurrences of birds are treated, perhaps only to be learned about by chance, and the difficulties of ferreting out data from my own and other people's records, make me fearful of recording errors or omitting records. I often think how small a portion of the ornithological history of any one area is observed from day to day,—how many rarities come and pass on without falling within the ken of any recorder. Fifty years of bird observation by our Club in Ottawa finds the Ottawa bird list still being written, still showing changes of status for many species, and new facts being gathered about them. There are many gaps yet to be filled before we know as much as we should about Ottawa's avifauna, and records of nesting for many species are particularly desired. My thanks are extended to the many observers who have given me the privilege of recounting their ornithological experiences.

The total of the Ottawa list in 1923 was 242 species; one native species is added in these notes, *viz.:* the European Widgeon, and two introduced species are added, making the total now appear to be 245.

1. *Podilymbus podiceps* (Linnaeus). PIED-BILLED GREBE.—One, a young bird, was brought to me alive, having been picked up on the road near the Rideau Bridges on Sussex Street. It was released in McKay Lake the same day and soon made itself at home there. The reason for its being found on the road is a mystery, as it seemed uninjured, and the only explanation at which I can guess is that it had been caught and abandoned by boys, or possibly it had got into difficulty by colliding with wires or with the bridge structure.

2. *Gavia immer* (Brünnich). LOON.—Former winter records are corroborated by F. H. Ostrom, who tells me that Loons, probably of this species, wintered, 1928-9, on the Rideau River near Hog's Back. On one occasion he heard the typical cry.

3. *Uria lomvia lomvia* (Linnaeus). BRUNNICH'S MURRE.—There was a late flight in 1925. E. G. White reported on December 9th that there were several hundred of them on the Ottawa River at the mouth of the Gatineau. Some were shot and I have a specimen of this date.

One duck hunter shot two on December 8th and turned them in to the National Museum. He saw many on this date at Gatineau Point, and others further down river on the 9th.

Another hunter reported 500 on the Ottawa River east of the city on December 8th, and got two.

The ferryman at Gatineau Point reported 500 on December 7th and 8th. He said they were fools, and that they flew along about six feet above the water. He called them Sea-crows, claiming he got the name from the Museum (!) and that he knew the birds from previous flights.

The following item was furnished the press on December 9th:

"FLIGHT OF BRUNNICH'S MURRE AT OTTAWA

"Several flocks of Brünnich's Murre were observed on the Ottawa River, in the immediate vicinity of the City, yesterday. As these are strange birds and might be shot by hunters in mistake for ducks, attention is called to the migration and also to the fact that this species is protected at all times under the Migratory Birds Treaty. Occasionally erratic migrations of this species occur. The most recent one in which any considerable number of birds were involved seems to have taken place in the winter of 1908-1909."

In 1926 they came our way again, and on November 25th E. G. White reported them on the river. On December 1st he reported several hundred as being at the foot of Kettle Island.

On November 20th, Jos. Dion shot one and saw three. On November 22nd several were

[1] *C.F.-N.*, 37: 101-5, 125-7, 151-6. 38: 10-16, Sept., Oct., Nov., '23. Jan., '24.

[2] *C.F.-N.*, 39: 16-17, Jan. '25.

seen near Arnprior and two were found dead in the fields. Also one was taken at Carleton Place (E.G.W.). I have one specimen from this flight,—a bird found nearly dead at the foot of Deschenes rapids about December 1, 1926, by W. J. Taylor of Britannia.

These strange migrations to death are a fascinating puzzle, for of these birds, doubtless, none ever returns to its breeding grounds.

4. *Moris bassana* (Linnaeus). GANNET.—P. A. Taverner[3] has recorded the capture of a juvenile at Richmond, Ontario, which was killed by the owner of a flock of domestic geese after it alighted with them, about October 15, 1924. It was said to have attacked the geese, and also to have been attacked by them. This specimen is in the National Museum. Two previous specimens are recorded in my 1923 list, and in the 1924 addenda there is a report of several good observers having seen one at Ottawa in November, 1923. Quite possibly this was the bird shot later at Rideau Lake. E. G. White tells me that a juvenile was picked up dead at the wharf at Aylmer, Quebec, on October 15th, 1929. The total occurrences for the Ottawa area now seem to be four specimens, two of which are in the National Museum, and one first-class sight record, corroborated by the later shooting of a specimen on water-ways outside our district but adjacent to it.

5. *Phalacrocorax auritus auritus* (Lesson). DOUBLE-CRESTED CORMORANT.—This species has been recorded for many years, but usually the occurrence has been of single examples. This led to my 1923 summary "fairly regular migrant, but scarce". On November 5, 1924, E. G. White received a report from a source he considers reliable of a flock of twenty Cormorants, undoubtedly Double-crested Cormorants, being seen at the Petrie Islands If they continue to occur in flocks, the "scarce" portion of the former statement of status will require amendment or deletion.

6. *Lophodytes cucullatus* (Linnaeus). HOODED MERGANSER.—The regular occurrence of the species on the Rideau River at St. Patrick Bridge and Cummings Bridge makes it seem possible that a pair breed in that vicinity. In 1926 the last one seen was a female noted on December 10th by E. G. White.

7. *Mareca penelope* (Linnaeus). EUROPEAN WIDGEON.—When the warm days came in March, 1927, my friend the late G. R. White asked me to call at his home and get some specimens of ducks in the flesh. He hated to see a specimen wasted. Although I was swamped with specimen making, always a spare time activity, I managed, with the help of Mrs. Lloyd, who has become an expert maker of bird skins, and an ever-present help in such emergencies, to save these specimens and all the others on hand. Of course they were all roughed-out, salted, and made up as opportunity offered. I am glad none were thrown away for when Mr. J. A. Munro was going through my collection a year later he identified one of the three ducks as of this species. It is a young male in changing plumage taken at Lochaber, Quebec, in the fall of 1926, probably October. This is the first known record of the species for the district, and it is unfortunate that through my failure to recognize this wanderer, Mr. White never knew of this, his last, addition to the list of the Birds of Ottawa.

8. *Spatula clypeata* (Linneaus). SHOVELLER.—Two were found in the day's bag of ducks at Lochaber Bay, Quebec, on October 10, 1925, by E. G. White.

9. *Marila valisineria* (Wilson). CANVAS-BACK.—E. G. White has reported as an exceptionally early date, four males and two females seen by him on February 13, 1925, on the Rideau River at Merrickville, Ontario (a few miles outside of our district).

10. *Somateria spectabilis* (Linnaeus). KING EIDER.—One additional occurrence has come to my attention. H. Burwash took a juvenile male at Shirley's Bay, on the Ottawa River, November 3, 1924. The bird was saved because Mr. A. Workman recognized it, and had the hunter who got it bring it to me. It is now in the National Museum collection.

11. *Oidemia americana* Swainson. SCOTER.—Eleven, among which were some males in fine plumage, were shot near Kemptville about the middle of November, 1926. E. G. White reported the occurrence.

12. *Chen hyperboreus* Subsp? SNOW GOOSE.—Dr. Jas. S. McKay of Ottawa advised me on December 20, 1923, that 50 to 70 light-coloured geese with rusty heads alighted at Bass Lake, near Thirty-one Mile Lake on the Gatineau (fifty-one miles north of Ottawa) during November, 1923. They came in with his semi-domesticated Canada Geese, and were different from any he had seen before, except that in the previous November, fifteen similar geese alighted in this lake. Dr. McKay was shown illustrations and thought these were Snow Geese. If they come again he will have his man secure a couple of specimens, although it is not his practice to allow any shooting at his place.

E. G. White tells me that a boy killed a white wild goose at Constance Bay on the Ottawa River in November, 1926.

[3] *Auk*, 44: 219, April, '27.

The late G. R. White paddled C. H. Routh up to a Snow Goose which he shot at Lochaber, Quebec, during the fall of 1927. E. G. White saw this bird after it was mounted in Montreal.

Mr. Marshall, a local hunter who knows the water-fowl of the area, described a flock of white "ducks" with black wing tips to Mr. Taverner. These birds were seen a few miles down river from Ottawa about April 27, 1928. Mr. Taverner thought the birds described were Snow Geese.

None of these records is particularly convincing by itself, but taken in conjunction with the specimens that have been taken one must feel that Snow Geese are beginning to travel this way in some numbers.

13. *Branta canadensis canadensis* (Linnaeus). CANADA GOOSE.—The 1923 lists puts the number of the Britannia flock of geese as being several hundred in 1922. This flock that gathers there in spring seems to be increasing, for the late G. R. White informed me that there were about 1000 birds there on April 18, 1925. In 1929 I received reliable estimates of the flock which make me believe that there were 2000 or more of the birds there.

14. *Branta bernicla glaucogastra* (Brehm). BRANT.—E. G. White and the late G. R. White have advised me that Pierre Trudeau shot two at Kettle Island about 1910. They were eaten by Mr. Arthur Throop, Mr. Deslauriers, and Mr. Trudeau. Mr. Throop saw them with the feathers on. The bird was said to be of the same species as the single bird shot by Thompson in 1887, as reported in my 1923 list.

Mr. E. G. White reports that Mr. J. Bedard shot one of three seen at Thurso, Quebec, on October 20th, 1927. He accepts the record and has recently seen the specimen.

15. *Ixobrychus exilis* (Gmelin). LEAST BITTERN.—Rare enough to report on the authority of C. E. Johnson, that one was found dead at White's Bridge on the Rideau, June 14, 1925. The specimen was too far gone to save.

16. *Ardea herodias herodias* (Linnaeus). GREAT BLUE HERON.—Occasionally individuals remain very late as did one which was reported to me as being seen near Belmont Street, Ottawa South, on December 13, 1925. Ten days after I had made a small pond on the creek adjoining my house in the spring of 1928, an adult was wading in it, while my family watched from the nearby windows.

17. *Nycticorax nycticorax nævius* (Boddaert). BLACK-CROWNED NIGHT HERON.—E. G. White noted four young birds in his garden on July 24, 1927.

18. *Porzana carolina* (Linnaeus). SORA.—C. L. Patch and Robert Lockwood took a nest with eggs and young about June 17, 1929. It was in a marsh bordering McKay Lake about 200 yards from my house.

19. *Gallinula galeata* (Lichtenstein). FLORIDA GALLINULE.—E. G. White saw a bird on its nest near the railway station at Sabourin on June 8, 1925, making a nesting record to add to previously recorded ones. R. E. De Lury states that they nest yearly at the water-fowl enclosure of the Poultry Division, Dow's Lake, Central Experimental Farm.

20. *Rubicola minor* (Gmelin). WOODCOCK.—Spring flight performance was noted near my house, Rockcliffe Park, April 4 and 5, 1928, when about three were "singing". The children thought they were nighthawks when they heard the "*peet*" note.

21. *Pelidna alpina sakhalina*. RED-BACKED SANDPIPER.—I took two at Britannia, Ontario, on October 13, 1924.

22. *Bartramia longicauda* (Bechstein). UPLAND PLOVER.—The first breeding record for the Ottawa district is reported by John Carruthers, taxidermist, Crysler, Ontario, thirty miles southeast of Ottawa. He says there are two or three pairs in his vicinity, and that he found a nest on his farm *about* 1925. This particular nest was destroyed by cattle. The birds had been there for many years before that, and in 1930 he told me that he had seen them every year since.

23. *Numenius hudsonicus* Latham. HUDSONIAN CURLEW.—A sight reocrd of a flock of about fifty birds has been recorded recently by L. H. de Puyjalon. They were seen at Britannia, Ontario, July 15, 1927.

24. *Pluvialis dominica dominica* (Muller). GOLDEN PLOVER.—C. L. Patch and C. E. Johnson found a flock of six at Britannia, Ontario, on October 8, 1923.

25. *Phasianus colchicus torquatus* Gmelin. RING-NECKED PHEASANT. Subsp.?—(Introduced.) The Provincial Department of Game and Fisheries has been distributing Pheasant eggs in Ontario and probably from this source have come the birds which have given rise to occasional accounts during the last few years of Pheasants being observed at or near Ottawa. One of the earliest accounts concerned a bird that was foraging in city back-yards near the mouth of the Rideau I think, in winter, and another, from W. J. Taylor, Britannia, told of several that wintered near there, a few years ago, but disappeared later. It is probably a question whether or not this species will adapt itself to this vicinity, where the snows are deep and food scarce in winter, and

become a self-reliant addition to Ottawa's avifauna.

26. *Bonasa umbellus togata* (Linnaeus). CANADA RUFFED GROUSE.—C. E. Johnson considers they are scarcer than formerly at Long Swamp, south of Ottawa. He has found no nests or young recently. An occasional bird turns up at the village of Rockcliffe Park, at the Experimental Farm, or in Ottawa South, but they seem to be scarcer near the city than even the recent extremely low ebb in the general Grouse cycle would warrant if they were holding their own.

27. *Columba domestica* Linnaeus. DOMESTIC DOVE.—(Introduced.) Without doubt this species has become acclimatized in the city and a limited number manage to sustain existence in a feral state. They nest about houses and public buildings, are usually voted a nuisance, and irate householders have been known to enlist the services of the city police in reducing their numbers. Since Forbush, *Birds of Massachusetts*, has called attention to this species as successful in its new environment in his area and has seen fit to add the species to his list, it gives me great pleasure to follow suit and include it in the list of Ottawa birds. The late G. R. White, whose name will always be bound up with Ottawa birds, used to feed great numbers of pigeons at his home.

28. *Zenaidura macroura carolinensis* (Linnaeus). MOURNING DOVE.—This species has become a moderately common summer resident in the district of late years. Noted to breed regularly in Gloucester Township by E. G. White. At the Long Swamp, south of the city, C. E. Johnson gives the following early dates of arrival: April 8, 1922; April 29, 1923; and March 29, 1925. On June 15, 1924, he banded two young that were then almost ready to leave the nest.

29. *Accipiter cooperi* (Bonaparte). COOPER'S HAWK.—The first definite breeding record was made by John Arkell, who took a juvenile specimen at Britannia, July 6, 1928. This specimen is about half grown and is so young as to be somewhat difficult of identification, but comparison, particularly of the long slender toes, with those of other species makes this juvenile plainly of this species. The specimen in question is in the National Museum collection, No. 23089. E. G. White considers that the species has always nested here, mentioning as a nesting locality Long's Swamp, east of the Rockcliffe Rifle Range.

30. *Buteo lineatus lineatus* (Gmelin). RED-SHOULDERED HAWK.—C. E. Johnson found a pair feeding young in the nest at Long Swamp, south of Ottawa, on April 13, 1925. E. G. White shot two at Lochaber, Quebec, on September 19, 1925, because they were attacking his live duck decoys, and these specimens are in my collection. Another I have was shot at Britannia, Ontario, by W. J. Taylor on September 20, 1926. He said it killed and ate a half-grown Plymouth Rock chicken and had plucked two hens on the back. Perhaps this indicates the inexperienced attempts of a juvenile to kill full grown hens.

31. *Archibuteo lagopus sancti-johannis* (Gmelin). ROUGH-LEGGED HAWK.—C. L. Patch collected one for the National Museum at Black Rapids on the Rideau River, November 9, 1926.

32. *Falco peregrinus anatum* Bonaparte. DUCK HAWK.—E. G. White informs me that one, a female, was shot by Hector Bedard at Shirley's Bay on the Ottawa River, October 18, 1924. Mr. White also reports that a female was shot at Innisville and preserved by a taxidermist at Carleton Place, according to a note dated April 10, 1926. (Latter occurrence is outside of district).

33. *Pandion haliætus carolinensis* (Gmelin). OSPREY.—Still occurs near the city. I saw one that had been captured near Billing's Bridge some three years ago. C. E. Johnson saw one at the same place on April 30, 1926, and says that another was seen to catch a sucker there on September 17, 1924.

34. *Strix varia varia* Barton. BARRED OWL. —In September, 1925, as nearly as we can recollect, one spent some time in a tree in front of my former residence on Queen Street. Mrs. Lockwood identified it by comparing the living bird with skins in my collection. R. E. De Lury reports one near the Dominion Observatory during the winter of 1929-30, where it killed numerous rats. He thinks that this bird or another also visited his garden on the look-out for flying squirrels that came there for food. C. E. Johnson saw one near his house on Cameron Street, Ottawa South, on November 4, 1927. Probably these birds are wanderers from the northern forests in late fall or winter. A recent specimen in my collection was secured by the late G. R. White from a farmer at Lochaber, Quebec, on October 20, 1923. Another I have was taken by W. J. Taylor at Britannia, December, 1925, because it was suspected of having designs on the pigeon coop.

35. *Cryptoglaux funerea richardsoni* (Bonaparte). RICHARDSON'S OWL.—One flew into the Letter of Credit Branch, Finance Department, East Block, Parliament Buildings, Ottawa, and was captured there on March 17, 1925. After I had seen it and arranged for its being kept in a temporary cage of file baskets, and for its release at dusk, H. F. Lewis called and banded it. R. E. De Lury reports one found dead on December 23,

1922, and transferred to the National Museum.

36. *Cryptoglaux acadica acadica* (Gmelin). SAW-WHET OWL.—E. G. White and I had an interesting time taking still and motion pictures of one that spent the day in his garden on February 17, 1928.

37. *Otus asio asio* (Linnaeus). SCREECH OWL.—There has been a brood hatched near my house in 1928 and 1929. On one memorable evening in 1928 a grey and a red adult were seen near the house with five youngsters just able to fly. To see seven Owls at once gave the children lots of excitement. C. E. Johnson, reports that it still nests near the Rideau River at Ottawa South.

38. *Nyctea nyctea* (Linnaeus). SNOWY OWL.—A big flight occurred in the winter of 1926-7 probably the first indication of it being that persons who had shot specimens endeavoured to sell them to the National Museum. It was reported by E. G. White, and others.

39. *Surnia ulula caparoch* (Muller). HAWK OWL.—On the Christmas Bird Census, December 24, 1922, Harlan I. Smith and I saw one near Tenaga, Quebec. C. E. Johnson saw one at Billing's Bridge, December 8, 1923. One, in the flesh, was brought to me early in 1926 by W. J. Taylor of Britannia who had taken it there earlier in the winter. E. G. White saw one at Ellwood, six miles south of Ottawa, on January 27, 1927.

40. *Picoides arcticus* (Swainson). ARCTIC THREE-TOED WOODPECKER.—Harrison F. Lewis observed one adult male, in the water-fowl enclosure at the Experimental Farm on September 23, 1927, and one adult male, near the corner of Echo Drive and Leonard Avenue, on September 29, 1927. Quite possibly these observations refer to the same bird. I saw one at the water-fowl enclosure on September 16, 1923,—it must be a favourite spot for the species.

41. *Phlœotomus pileatus abieticola* (Bangs). NORTHERN PILEATED WOODPECKER.—One of the most delightful bird adventures we have had at Rockcliffe Park was the visit to us of a Pileated Woodpecker. It first came at 4.30 p.m., on October 12, 1928, and excavated a hole in a hollow basswood for sleeping quarters. This tree is not more than fifty feet from the house. The chips, from live wood, were up to three inches by two inches in area, and an eighth of an inch thick. Each chip had two or three gouge-like beak marks across its surface. At 4.50 p.m. on the next day the Pileated came home, and although we were all outdoors, it went directly to its own tree and after a brief survey of affairs in the vicinity, retired. The approach was silent except, possibly, for a single Flicker-like note in the distance. About 9 a.m., on the 14th, our bird woke me up with a loud *kuk-kuk-kuk* call and it looked very large as it climbed up the home basswood. Promptly at a quarter to five it came home, undoubtedly after a day among the big hardwoods of the neighbourhood. We were all impressed by its great length of neck, as it swung its head with a curious bobbing motion, that was used, without doubt, to give a view on each side of the home tree, before going into the hole for the night. A Pileated, thought to be the same bird, came back on March 22, 1929, possibly, or certainly, on the 23rd, and slept in its winter home. Robert Lockwood followed it through the village collecting bark fragments that it was stripping from dead trees. Some of the pieces were over a foot long. This spring visit was a brief one, and after a couple of days the bird was not seen again. During the winter of 1926-27 one visited F. H. Ostrom's place, near Hog's Back, on the Rideau River, to get suet.

42. *Melanerpes erythrocephalus* (Linnaeus). RED-HEADED WOODPECKER.—C. E. Johnson adds two more breeding records to the scanty list. On June 3, 1922, he found an occupied nest at Rideau Park, and on July 16, 1923, three miles south of Ottawa on the C.P.R. railway line he banded three fledglings which were then about ready to leave the nest. Alice and William Lanceley[4] have recorded a pair of adults bringing two juveniles to their feeding station, during the summer of 1927, at Lindenlea, Ottawa. R. E. De Lury reports a pair nesting near his home during the past two or three summers. He has banded the old ones and some young which they brought to the feeding station.

43. *Empidonax trailli alnorum* Brewster. ALDER FLYCATCHER.—At Dow's Swamp, July 6, 1926, C. E. Johnson took a bird, nest, and eggs for a National Museum group. Although the species has long been known to be here in the nesting season in suitable places, this seems to be the first definite breeding record.

44. *Perisoreus canadensis canadensis* (Linnaeus). CANADA JAY.—One was at our feeding station, November 11, 1929,—the first I have seen in the district. On December 22, 1929, B. A. Fauvel and I saw two near Ste. Rose de Lima, Quebec, when we were taking the Christmas Bird Census. R. E. DeLury reports one as having been seen at the Central Experimental Farm some eight years ago.

(To be concluded)

[4] *C.F.-N.*, 43: 62-63, March, 1929.

A NEW FOSSIL CROCODILE FROM SASKATCHEWAN

By C. M. STERNBERG

INTRODUCTION

SYSTEMATIC collection of veterbrate fossils by the writer and detailed study of the stratigraphy by Dr. F. H. McLearn have shown that dinosaur-bearing beds of Lance age are present in southern Saskatchewan from the Cypress Hills to Twelve Mile Lake. The dinosaurs have been found only in the lower or non coal-bearing part of the Ravenscrag, and McLearn has tentatively called this part of the formation Lower Ravenscrag and has correlated it with the Lance.[2] He has also tentatively called the upper, coal-bearing and greater part of the formation, Upper Ravenscrag (loc. cit. pp. 40-41) and has provisionally correlated it with the Tullock and other Paleocene formations of southern Montana or the Puerco of New Mexico. This correlation of this part of the Ravenscrag is supported by the vertebrate evidence obtained in the field season of 1929.

The Ravenscrag beds were very carefully examined but not a fragment of a dinosaur was found above the first coal seam which McLearn has used as a tentative division between the Lower and Upper Ravenscrag. Bones of *Champsosaurus* crocodiles, turtles, and the scales of *Lepisosteus* are common at certain localities in the Upper Ravenscrag, especially in some of the buff or cream-coloured strata.

The most important specimen secured from these upper beds is a very good skull of a crocodile, with incomplete lower jaws and some parts of the skeleton, collected by the writer in August, 1929. It appears to represent a moderately young animal as most of the sutures are quite open and well shown. A careful study of the specimen shows that it is referable to the genus *Leidyosuchus* which was established by the late L. M. Lambe for a brevirostrate, procoelian crocodile from the Belly River formation of Alberta.[3] A second species of this genus, from the Lance formation of Wyoming, was described by C. W. Gilmore as *L. sternbergii*.[4] More recently Mook described a third species, from the Torrejon beds of New Mexico, as *L. multidentatus*.[5] The Saskatchewan species appears to be intermediate between the two last mentioned species but quite different from either. The intermediate stage of development of this species would seem to support McLearn's correlation of the Upper Ravenscrag with the lower Paleocene.

Leidyosuchus acutidentatus new species
Pls. I and II

Type: No. 8544, Geological Survey, Canada, consists of skull, left dentary, part of right dentary, splenial, parts of anterior vertebræ, parts of left fore limb and dermal scutes.

Locality and horizon: S.E. ¼ Sec. 31, T. 5, R. 28, W. of 2 principal meridian, southeast of Montague Lake, Saskatchewan, 60 feet above base of buff, fine-grained sands and silts, in the lower part of the Upper Ravenscrag formation, Paleocene.

Specific characters: Skull relatively long and slender; cranial table short and broad; anterior extremity of snout broad; supratemporal fossæ broader than long; orbits egg-shaped and of moderate size; twenty teeth in maxilla; anterior teeth proportionately long and sharply pointed; posterior teeth with crowns well defined, laterally compressed and acutely pointed; lower canines very long and slender.

SKULL

When viewed from above (Plate I) the skull of *L. acutidentatus* differs from that of *L. sternbergii* in being more slender and having the cranial table shorter and broader, the supratemporal fossæ shorter, the orbits small and more uniformally egg-shaped, and the extremity of the snout more broadly rounded. In all of these respects it differs even more from *L. canadensis*.[6] The nasals, prefrontals, and lachrymals are somewhat caved in by crushing but the uncrushed maxillæ suggest that the top of the skull was gently rounded laterally or almost flat. The cranial table does not stand up at a higher level than the rest of the skull, as it does in some of the modern crocodiles but the parietals, frontals, and nasals are all on the same plane. A gentle upturning of the snout, however, gives the top of the skull a slight fore and aft concavity.

The top of the skull is marked by a series of pits and shallow, elongated depressions. The pits are deepest and best defined on the parietals, postfrontals, frontals, prefrontals, and midportion of the jugals. Farther forward the deep

[1] Published with permission of the Director, Geological Survey.

[2] Geol. Surv. Canada, Summ. Report 1928, Part B., pp. 38-40.

[3] Trans. Roy. Soc. Can. Sec. IV, Vol. I, 1908, pp. 219-244.

[4] Proc. U.S. Nat. Mus. 38: 485-502, 1910.

[5] Mook, C. C., Amer. Mus. Novitates No. 447, Dec. 1930.

[6] See Sternberg, C. M., The Skull of *Leidyosuchus canadensis* Lambe. American Midland Naturalist, 13: 157-169, July, 1932.

PLATE I

Less than $\frac{1}{3}$ Natural Size.

pits give way to smaller, shallower pits and longitudinal ridges and grooves.

The supratemporal fossæ are subcircular but with the width slightly greater than the length. The external borders of these openings, formed by the postfrontals, is approximately the same breadth as the coalesced parietals which separate them, thus differentiating from *L. sternbergii* in which the lateral borders are much narrower. The lateral temporal fossæ are about the same length as in the Lance species, but proportionately narrower. The orbits are smaller than in Gilmore's species and are quite uniformally egg-shaped with the point extended forward. This decrease in size and more gently rounded posterior border is due to the narrowing of the skull and broadening of the postorbital bar. The external nares are confluent and form a sub-round aperture which is slightly broader than long. It is broadly rounded in front and not indented, posteriorly, by projections of the internal borders of the premaxillæ, thus differing from both *L. canadensis* and *L. sternbergii* in which it is heart-shaped with the apex pointing forward.

The palatal portion is somewhat deficient, posteriorly, but the anterior palatine vacuity and the anterior portion of the posterior palatine vacuity are well defined. The former is elliptical and has a length of 20 mm. and a breadth of 14 mm. As far as can be determined the posterior palatine vacuity resembles that of the Lance species but extends farther forward. The anterior borders extend farther forward reaching to opposite the anterior extremity of the palatine.

BONES OF THE SKULL

Most of the bones of the top of the skull are well defined and the sutures are quite open. These are shown in Plate I, which was made from a photograph of the specimen.

The parietals are thoroughly coalesced and marked on top by deep, well-defined pits. On the posterior and broader portion the pits are arranged in a circle surrounding four small pits which are centrally located. On the surface between the supratemporal fossæ are two longitudinal rows of pits separated by a straight, smooth ridge, on the midline, and bounded laterally by the smooth, slightly raised, internal borders of the supratemporal fossæ. At the anterointernal angle of each supratemporal fossa the frontals send a small tongue of bone outward and forward to lap the frontals and meet a similar tongue-like process of the postfrontals which is directed inward and backward just below the surface. In this particular *L. acutidentatus* somewhat resembles *Gavialis gangeticus* Gmel., as figured by Mook.[7] The least width of the parietals between the supratemporal fossæ is 14 mm. The suture between the parietal and squamosal is internal to the middle of the supratemproal fossa. The postorbital bar is broader than in *L. sternbergii*.

The coalesced frontals resemble those of *L. canadensis* but are shorter, slightly broader in their interorbital portion and narrower in the tongue-like forward projection. The pitting on the posterior portion is similar to that on the parietals and the pits are equally large and

[7] Bull. Amer. Mus. Nat. Hist., 44: 131, 1921.

well defined. On the tongue-like anterior portion the pits become smaller and finally give way to very low irregular ridges.

The prefrontals and lachrymals are longer and narrower than in *L. canadensis*. The narrowness of the prefrontals is most noticeable in the posterior or orbital portion. The jugals are longer than those of *L. canadensis* and the pits, on the surface, are deeper. They extend farther back than Gilmore's figure shows for the Lance species.

The nasals are narrower than in other species of the genus in which they are preserved. Due to injury to these bones it is not possible to determine their anterior extremity but apparently they did not reach the external nares. The posterior border of the external nares is well preserved and there is no sign of the nasals appearing between the premaxillæ. As the other sutures are so well shown it seems probable that if the nasals were developed in this region they would be discernible.

The maxillæ resemble those of *L. sternbergii* in shape, but are not so well sculptured. On the postero-internal portion of the bones are a few well-defined pits but most of the surface carries shallow, elongated, broken, longitudinal grooves or shallow pits. The maxilla carries twenty teeth which is one more than was present in the maxilla of *L. sternbergii*, and several more than in modern brachyrostrate crocodiles. The separation between the alveoli is almost the same throughout the series except that between four and five. The maxillary-premaxillary notch, for the reception of the lower canines, is more sharply defined than in the Lance species. The premaxillæ are short and broad, especially the anterior extremity. The breadth of the muzzle through the anterior edge of the external nares is four-fifths of that through the broadest part, whereas in *L. sternbergii* this measurement shows only one-half that of the greatest breadth. The premaxilla carried five teeth, all but the first of which are preserved at least in part.

When discovered, the skull was lying upside down and the palatal portion (Pl. II, Fig. 1) was very close to the surface and badly cracked by the effects of the elements. It is, therefore, not possible to give much detail regarding the palate. The pterygoids and transpalatines were completely destroyed. The specimen was injured at the union of the premaxillæ and maxillæ and the suture between these bones is lost. Sufficient of the premaxillæ, however, is preserved to show that the antero-internal tips of the palatal portion of the maxillæ do not divide the premaxillæ and reach the anterior palatine vacuity as is the case in *L. canadensis*. This division was probably similar to that of the Lance species. Between, and internal to, the alveoli of the first and second teeth of the premaxilla, is a large pit for the reception of the first dentary tooth.

The occipital condyle is more nearly horizontal than in *L. sternbergii* and the basioccipital is less inclined downward in its forward extension. The supraoccipital is smaller than in *L. canadensis* especially in its vertical diameter. It is situated midway between the superior border of the foramen magnum and the surface of the parietals and its vertical diameter equals about one-third of this distance.

COMPARATIVE MEASUREMENTS OF THE SKULLS OF *Leidyosuchus*

	Type of *L. acutidentatus*	Type of *L. sternbergii*	*L. canadensis* No. 8543 Geol. Surv. Can.
	mm.	mm.	mm.
Length on midline including condyle	358	303	358
Breadth between outer edges of quadratojugals	173	184	195
Length in front of orbits	230	200	225
Breadth at front of orbits	130	132	158
Breadth across fifth maxillary teeth	81	77	112
Breadth of snout, across premaxillæ	67	58	81
Breadth of snout at notch	50	50	60
Width of foramen magnum	18	16	
Height of foramen magnum	15	13	
Length of supratemporal fossa	28	33	
Width of supratemporal fossa	30	23	
Length of orbit	51	55	58
Width of orbit	44	38	58
Length external nares	25		30
Width external nares	30		41
Length premaxillæ vacuity	18	12	28
Width of premaxillæ vacuity	15	13	20
Length of parietals	40	40	
Width between supratemporal fossæ	14	17	
Length of frontals	104		120
Greatest width of frontals	47		50
Width interorbital portion of frontals	21		19
Length of prefrontal	87		76
Greatest width of prefrontal	18		21
Greatest length of lachrymal	79		80
Greatest width of lachrymal	21		29
Length of premaxillæ, superiorly	74		99

MANDIBLE

The mandible seems to be intermediate between that of *L. sternbergii* and *L. multidentatus* though the Torrejon species lacks certain characters which have heretofore been regarded as typical of the genus. In Mook's species the splenial does not take part in the formation of the symphysis and the third dentary alveolus is widely separated from, and much smaller than, the fourth. In all other known species of the genus

the splenial takes part in the formation of the symphysis and alveoli three and four are subequal and separated by only a very thin partition of bone. Mook shows twelve small alveoli in the depressed area between No. 4 and the two enlarged alveoli, which are on the next convex portion of the dentary, whereas in the Saskatchewan specimen there are but six alveoli in this space. It will be seen that the additional teeth in *L. multidentatus* are to be found in this area.

The left dentary is nearly complete and has alveoli for nineteen teeth preserved. Most of the anterior two-thirds of the right dentary is also preserved (P. II, Fig. 2, D). Five teeth are present in each dentary besides two germ teeth on the left side. The dentary is of lighter construction than in *L. sterngergii* but not so slender as in *L. multidentatus*. The greatest breadth, opposite the fourth tooth, is 29 mm. This is 3 mm. less than that given by Gilmore, though his specimen represents a smaller individual. The symphysis is short and is contributed to by the splenial though it is not possible to state to what extent. The alveolus for the first tooth is broken away, but it must have been close to the symphysis and quite widely separated from the second. The other teeth are about equally spaced, *i.e.*, about 10 mm. from centre to centre. Thus, where the teeth are smaller the distance between the alveoli is greater. The third and fourth alveoli are subequal and the largest of the series. They are twice as large as the sixth, seventh, and eighth. Thus, whereas, the partition between the third and fourth teeth is very thin, that between the sixth and seventh has a width of 5 mm.

The splenial is a very thin long plate of bone which is fitted on the inner face of the anterior portion of the dentary. The bone was disarticulated and somewhat distorted, and the anterior end destroyed, so it is not possible to state to just what extent it entered into the formation of the symphysis.

MEASUREMENTS OF THE DENTARY

Total length of dentary about	275 mm.
Breadth through centre of fourth tooth	29 mm.
Height of symphysis opposite fourth tooth	20 mm.
Length of symphysis about	50 mm.
Breadth of dentary through eighth tooth	16 mm.
Height of dentary opposite eighth tooth	19 mm.
Diameter of largest alveolus	10 mm.
Diameter of smallest alveolus	5 mm.

TEETH

The dental formula of *Leidyosuchus acutidentatus* is $\frac{25}{20+}\ \frac{25}{20+}$. In the upper jaw each premaxilla carried five and each maxilla twenty teeth. The first premaxillary tooth is the only one of the upper series that is not represented at least in part. On the right side the second is represented by the fang and the base of the crown, the third by a germ tooth, the fourth by a fully developed tooth and the fifth lacks the tip but is complete on the left side. The twenty maxillary teeth are preserved on the right side, but numbers three, four, and twelve have lost their tips. We are very fortunate in having the complete series of maxillary teeth and to have them so splendidly preserved. The only point about which there can be any doubt is the length of the fourth tooth as the one in the left maxilla was being erupted and that on the right side has lost the tip. The teeth are all present in the left maxilla except the last one.

In the premaxillæ the fourth tooth appears to have been the largest, though the third, as shown by the base of the crown, was not much smaller. The second is somewhat smaller and the fifth is the smallest tooth in the skull. The first is widely separated from the second, the fifth is very close to the fourth, and the others are uniformally spaced. The premaxillary teeth are subcircular in cross section, long, slender, and sharply pointed. The crown bears faint carinæ just internal to the midline of the tooth, but there are no longitudinal folds or striations. The teeth are slightly curved inward and the crowns are not set off from the fang by a constriction as is the case with the posterior teeth.

The first three maxillary teeth are small, slender, and very sharply pointed. The distal half of the crown is slightly incurved and laterally compressed, but the base is subcircular and there is no well-defined constriction between the crown and the fang. There is no sign of folding, but on each side a distinct sharp-edged carina is located a little toward the inner face of the crown. The fourth and fifth maxillary teeth are subequal in size and though the only fully developed one (Rt. No. 4) has lost much of the crown a comparison of it and the immature canines shows that these teeth were very long and relatively slender. They are much longer, more slender and more sharply pointed than those of *L. canadensis*. They are subcircular and the fore and aft carinæ are not well defined. There is considerable difference in the stage of development of these canine teeth in each maxilla and it is probable that their development was alternate. The fifteen maxillary teeth behind the canines are similar in shape and uniformly spaced. They gradually increase in size from the sixth to the eleventh, from where they decrease again, but the difference in size is not conspicuous. The fangs are larger than the crowns and circular in cross-

PLATE II

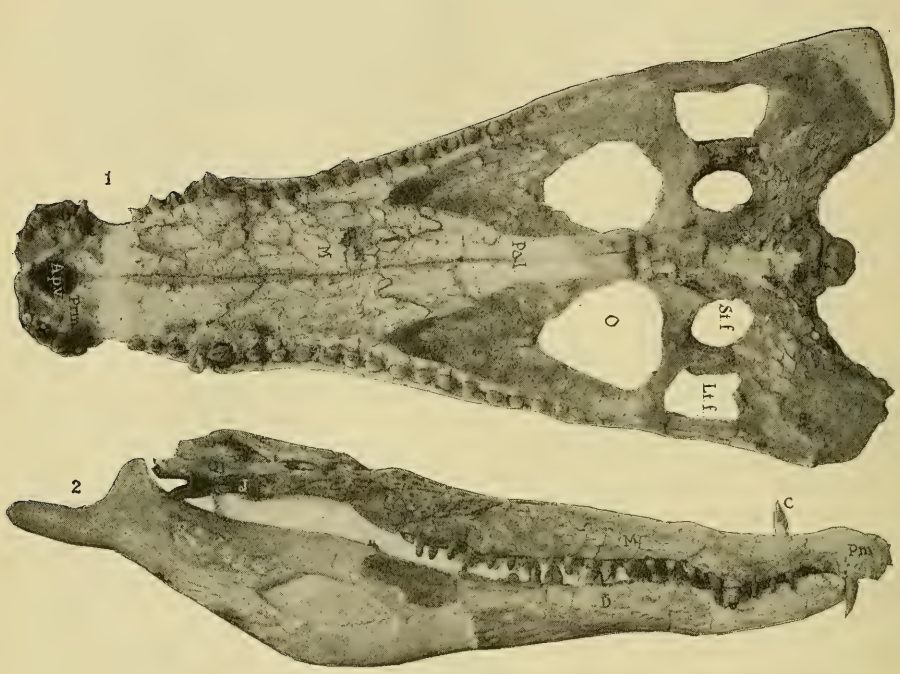

FIGURE 1
Inferior View
About ½ Natural Size.

FIGURE 2
Side View
Less than ¼ Natural Size.

section except for a flattening on the inner side. The crown is divided from the fang by a well-defined neck or constriction and is laterally compressed. Though the crown is short and broad (fore and aft) it terminates in a sharp point. On the teeth immediately succeeding the canines the carinæ are internal to the middle of the crown, but in the posterior teeth these ridges mark almost the centre of the anterior and posterior faces. The inner face of the crown is almost flat, whereas the outer face tapers from the broad base to the narrow tip thus giving the outer face of the crown a convex contour. In none of the teeth is the antero-posterior diameter of the crown greater than the height as shown by Gilmore for the posterior teeth of *L. sternbergii*, (loc. cit. p. 491). The following measurements give an idea of the relative proportions of the teeth, the first measurement represents the height and the second the antero-posterior diameter at the base of the crown taken in millimeters. Fourth premaxillary, 18–6; maxillary teeth, first 9–4; fourth 22, estimated–9; eighth 8–5.5; eleventh 9–6.5; fourteenth 9–6; eighteenth 5–4; twentieth 4–4; fourth dentary tooth 23–7.5. There is a very fine wrinkling of the enamel on most of the teeth behind the canines. It is best shown near the tips and on the posterior teeth.

The first dentary tooth bites into a pit in the premaxilla and the third and fourth bite into a notch between the premaxilla and maxilla. The lower teeth alternate with the upper and bite within and between the maxillary teeth. External to, and in advance of, the fifteenth, sixteenth, and seventeenth teeth are moderate-sized but well defined pits into which maxillary teeth bite. This alternation of the teeth is well shown in Pl. II, Fig. 2.

The fourth tooth (the most advanced of the dentary series preserved) is very long, slender, inwardly curved, and rather sharply pointed. In the articulated head this tooth extends well above the top of the skull, (Pl. II, Fig. 2, C). It is subcircular in cross section but with a very slight flattening of the inner face in its distal half. The carinæ, which are low but well defined, do not reach to the base of the crown and the crown is not separated from the fang. The third dentary tooth was similar, in size and shape, to the fourth, as shown by the alveolus. Germ teeth are present in the sixth and eighth alveoli of the left side while number seven carries a fully developed tooth.

These three teeth are small, slender, laterally compressed, and very sharply pointed. The eleventh, twelfth, fifteenth, seventeenth, eighteenth, and part of the nineteenth teeth are preserved in the right dentary. They are acutely pointed, the inner face flat, the outer face convex, and they are less compressed laterally than the posterior maxillary teeth. They do not differ greatly from the dentary teeth of *L. canadensis* except that they are more slender and more sharply pointed.

EXPLANATION OF PLATES

PLATE I

Skull of *Leidyosuchus acutidentatus*, No. 8544, Geol. Surv., Can. Superior view. Less than 1/3 natural size.

PLATE II.

Skull of *Leidyosuchus acutidentatus*, No. 8544, Geol. Surv., Can. Figure 1, Inferior view. About 1/3 natural size. Figure 2. Side view less than ¼ natural size.

Apv. premaxillary vacuity, C. canine, E. na. external nares, Exo. exoccipital, F. frontal, J. jugal, L. lachrymal, Lt. f. lateral temporal fossa, M. maxilla, N. nasal, O. orbit, Oc. c. occipital condyle, P. parietal, Pal. palatine, Pof. postfrontal, Prf. prefrontal, Prm. premaxilla, Pt. pterygoid, Q. quadrate, Qj. quadratojugal, S.t.f. supratemporal fossa, Sq. squamosal.

PALÆONTOLOGICAL NOTES[1]

By ALICE E. WILSON

IN THE mapping of the Westport sheet by M. E. Wilson, a peculiar inset of Black River rocks was found southwest of Westport village. All other exposures in the region are of Potsdam or Beekmantown age—a fact which lends interest to the Beekmantown and Black River forms.

The Beekmantown in this region is represented by interbedded sandstone and dolomitic layers. The Beekmantown forms, here described, come from both the sandstone and dolomitic layers. They are very problematic, but the fossils of these lower Beekmantown beds are so limited in number that in seems advisable to call attention to these specimens. Future collectors may be interested in searching for similar forms which are better preserved.

The Black River forms are of special interest because of the correlation of the beds and because they exhibit some interesting details of the ontogeny of one form and the interior of another.

BEEKMANTOWN FORMS

TUBES

Plate I, Figure 6

Several pieces of the domolitic phase of the Beekmantown from this region show peculiar tubular forms which may not be organic. There appear to be some very fine grains of sand present. The somewhat crystalline dolomite weathers so that the surface has the roughened texture of sandstone. The laminations become marked and very much resemble a small section of cross-bedding in sandstone.

Tubes slightly curved so that the weathering shows an oblique section, diameter ranging from 9 mm. to 13 mm., centre hollow, with diameter from 4 mm. to 8 mm., walls apparently comparatively thick, but possibly the obliquity of the section accentuates this thickness. The walls of some seem to be solid, others appear to have enveloping concentric tubes. This feature is exaggerated in some cases by weathering across the laminations of the matrix just as patterns are brought out by cutting the concentric layers of agate. The hollow central tube filled with matrix, however, indicates that the origin of the form cannot be due to the weathering of the laminations, though it has been made more spectacular by it.

No structure is evident in the specimens found, making their exact nature obscure—if worm burrows, the worm was much larger than that forming the *Scolithus* burrows in the underlying Potsdam beds; if an aquatic plant stem, it must have indurated the encompassing sedimentary case during its decomposition.

Horizon and Locality:—Beekmantown, Lot 5, Con. 10, Bastard tp., Leeds Co., Ontario.

National Museum of Canada, Ottawa: holotype, Cat. No. 6810.

PROBLEMATIC FORM

Plate I, Figure 1

The piece preserved is fragmentary, but shows a portion of several rhomboid meshes about an inch in diameter. They are filled with the matrix. Each side of the mesh, or partition as it

[1] Published with the permission of the Director, Geogical Survey of Canada, Department of Mines, Ottawa.

shall be called below, is attached at each end to the side of another partition at about one third to one quarter of its length from the end. The partitions in the beginning are at right angles to one another, the completed mesh is somewhat rhomboid in form, but that may be the result of pressure. In natural section the partitions are not linear but constricted at the ends and inflated towards the middle. One fairly complete partition measures 1 mm. at each end and 6 mm. at its widest part. Another specimen shows a mesh having a depth of 10 mm., a part of it being still buried in the matrix. At one side of the meshes preserved in the larger specimen is a long cylindrical cavity about 3 mm. in diameter. One of the partitions seems to have its origin in the lost structure which filled this cavity. A second partition can be traced to within a few millimetres of it and perhaps is also connected with it.

Two small oval bodies, 5 to 7 mm. in length and 1½ to 3½ mm. in width are placed on each side of two of the best preserved partitions. They are each attached to the side of the parent partition by a small projection.

Is the origin of this peculiar rhomboid form organic or the result of a secondary mineral deposition? If organic, it must be some reticulate form of alga. The peculiar hollow, stem-like cavity at the side supports this interpretation. Other features, however, seem to be more suggestive of a mineral origin. If so, a previous condition of local pressure must be postulated, resulting in a more or less regular rhomboid network of cracks. Into these cracks mineral depositing water must have penetrated. The peculiar inflated condition in the centre of each partition might be due to the aggregation of the mineral matter indurating the matrix in a manner somewhat like the growth of a concretion.

Horizon and Locality:—Beekmantown, from the sandy beds which are interbedded with dolomitic layers, Lot 14, Con. VII, Bastard tp., Leeds Co., Ontario.

National Museum of Canada, Ottawa: holotype, Cat. No. 6811a.

CYSTID ? FORM

Plate I, Figure 2

On the fragment containing the peculiar reticulate markings is an indistinct impression resembling a cystid stem. The form is not complete. It is 25 mm. in length, very slightly curved, one end resembling a stem, 15 mm. in length and 1 mm. in width, with very fine annulations or projecting discs, 3 to 4 in 2 mm. The other end widens to 6 mm. There is an impression of a small cup-like cavity which has been flattened. Faint annulations mark the lower part of the cavity.

Worms and worm burrows from these lower Palæozoic beds do not show annulations. Cystids have been recorded but not described from beds higher up in the Beekmantown. If better specimens should demonstrate that this is a cystid the degree of the development of the stem is worthy of note. The stem of the Echinodermata began by a protuberance at the base. At first it was filled with organic material projecting from the body visceral mass, and covered by irregular plates. As development continued the plates became regular and increased in number, pushing outward. The organic matter remained in the globular body part of the organism, except for the minute central cavity which pierced the centre of each disc. Early cystids usually have short tapering stems. At the top they are wider in proportion than those of the crinoids of the same size. The stem in question, however, is very fine. Though one of the earlier cystids it must have reached a stage in which the stem is well developed, though short, and all of the organic material has remained within the body cavity.

It is recognized that the above form is somewhat problematic but the writer desires to call attention to it in the hope that it may stimulate a more thorough search for better material of this type.

Horizon and Locality:—Beekmantown. From the sandy beds which are interbedded with dolomitic layers, of the Beekmantown of this region. Lot 14, Con. VII, Bastard tp., Leeds Co., Ontario.

National Museum of Canada, Ottawa: holotype, Cat. No. 6811b.

CORRELATION

In association with these somewhat problematic forms given above are found such typical shells as *Ophileta compacta* and *Pleurotomaria canadensis* which indicate the Beekmantown horizon of the beds. The Beekmantown in this region consists of sandstone interbedded with dolomitic beds. Raymond[2] has written as though the dolomitic layers were entirely above the sandstone layers, but later work has shown that this is not the case. Not only have they been found interbedded in place but in addition both the sand layers and the dolomitic layers carry characteristic Beekmantown fossils.

Farther east, down the Ottawa River, near Thurso, these interbedded layers are overlain by thick-bedded dolomitic layers, which often contain cavities filled with calcite. These are succeeded by thin-bedded impure dolomitic layers

[1] Raymond, P. E., Geol. Surv. Canada, Intern. Geol. Congr. Guide Bk. 3, p. 139, 1913.

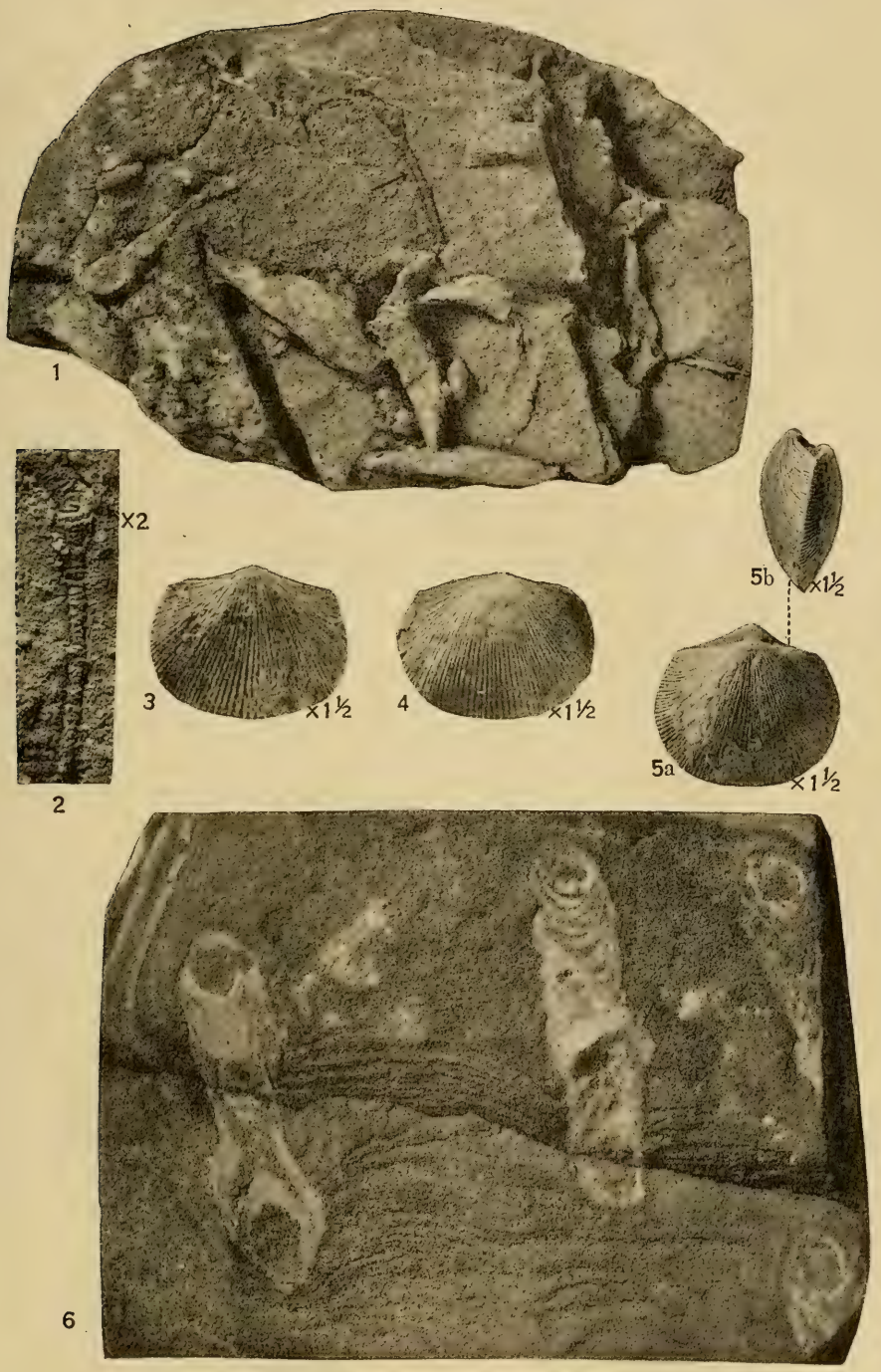

PLATE No. 1

which in many places show partings with mud cracks, mud ripples and such near shore phenomena. No fossils have been found in this uppermost phase in this region. Still farther east at Hawkesbury and on the island of Montreal the upper beds, as exposed there, are interbedded with more calcareous layers in which fossils are not rare. To these upper beds near Montreal Raymond[1] has give the name "Beauharnois", and he relates the fauna with that of the lower Beekmantown of the Champlain valley. If the fossil content shows that the upper beds, the Beauharnois, are lower Beekmantown, then the lower beds which Raymond correlates with Cushing's Theresa must be basal Beekmantown. Cushing's[2] original intention was to consider the Theresa as "passage beds" between the Potsdam and the undoubted Beekmantown. Ulrich correlated some of the fossils in the upper beds of Cushing's Theresa with the Beekmantown and some from the basal layers with the Potsdam, and an unobserved conformity has been proposed in order to arrange the fossils according to accepted classification.

The fossils found in these "passage beds" in the Westport and Perth sheets are undoubtedly Beekmantown in age. The writer, however, has seen forms of *Lingulepis acuminata* in beds which are presumably from the base of these "passage beds" and *L. acuminata* is representative of the Potsdam. Accepting these facts, then, there are two possibilities, the existence or the non-existence of an unconformity separating the Potsdam and the Theresa of the Beekmantown age.

Consider first the existence of an erosional period between the Potsdam and the "passage beds." Cushing states that in the type locality of the Theresa the Potsdam grades up into the Theresa and that the "passage beds" appear to grade up into those beds which lack the interbedded sandstone, which he regards as undoubted Beekmantown.

Ulrich finds Potsdam fossils in the base and Beekmantown fossils in the upper part of Cushing's Theresa, therefore, supposes there must have been an unconformity between the two. Suppose such an unconformity does exist, would it necsarily be above those basal beds which bear *Lingulepis acuminata?* For example:—All through the Ottawa, St. Lawrence and Champlain valleys *Saxicava* shells are deposited from the Champlain sea. Another invasion of the sea would work over the loose material in which these shells are now imbedded. In some places the present erosional period would be easily detected by an erosional unconformity. The new sea might still contain some of the same forms as the Champlain sea, or it might not. If the new sea laid a sandy base upon districts which are now covered with Champlain Sea sand, would not the two be reworked together? If the new sea still held *Saxicava* shells they would mingle. If it did not contain them it would rework the Champlain sea forms, particularly those that are now to be found in the sand. Thus in its basal sandy deposit of its lowest horizon the later sea might easily contain forms from the preceding invasion. The typical forms of the new sea would then follow. But the new deposition would begin below the horizon which contained the *Saxicava* shells, picked out from the upper sands of the Champlain sea. And it is well to remember, in this comparison, that the top of the Potsdam and the base of the Theresa are both sandy phases.

On the other hand there is the possibility of no erosional interval. During a continued period of deposition the living forms of the Potsdam sea gradually gave place to those forms which elsewhere have been deposited in the sediments of a sea which has succeeded a recognized interval of erosion. In addition to this change in fauna there is a change in the chemical deposits of the water. Where then is the line to be drawn between the two depositions in a region in which there is a continued deposition? Such a line at best must be more or less arbitrary. At some place beyond the margin of each succeeding inundation there is a region of continued deposition. The change in the chemical content of the sediments of the Potsdam and the Beekmantown seas is the record of a change in material brought to the ocean. It must have preceded the change in deposition. It would seem logical to consider that the change in chemical composition would correspond with the period of erosion elsewhere. Hence the logical place to draw the line in the rocks deposited would be below the first appearance of a change in deposition, that is, the first appearance of dolomite in the matrix of the sand, which would be below these basal Theresa beds.

BLACK RIVER FORMS

Order....*Protremata*
Family..... *Orthidæ*
Genus.....*Hebertella*
Subgenus..*Doleroides*

Doleroides pervetus ottawanus n. var.

Plate I, Figures 3-5; Plate II, Figures 14 and 15.

In his reclassification of the genus *Pionodema*, Cooper[1] has divided the genus into two genera

[1] Raymond, P. E., Geol. Surv. Canada, Summ. Report, 1911, p. 352, 1912.
[2] Cushing, H. P., N.Y. Mus. Bull. 145, p. 65, 1910.

[1] Cooper, G. A., Journ. Pal. 4, p. 369, 1930.

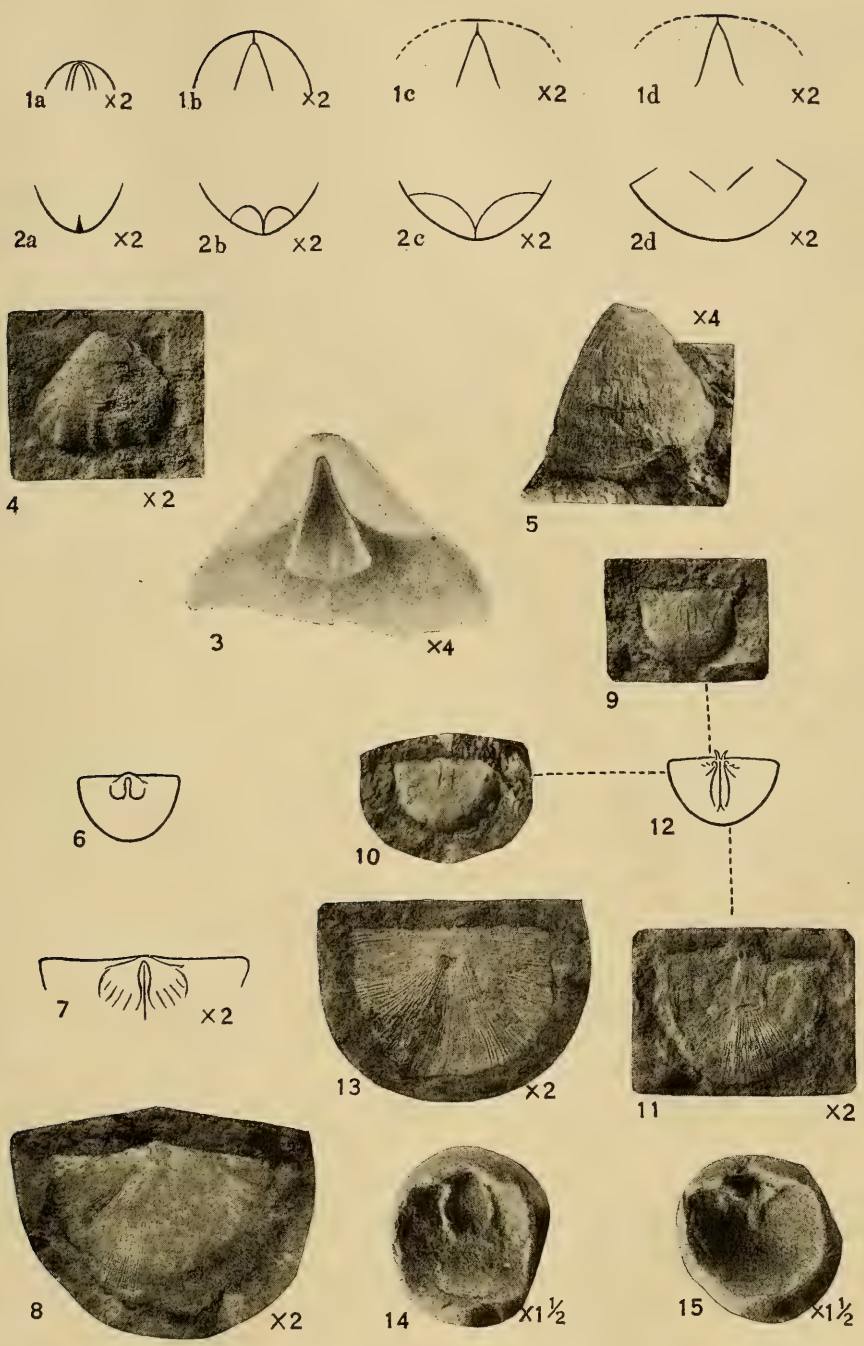

PLATE NO. 2

and a subgenus. The separation has been based both on internal and external features. Of the two Black River genera, *Pionodema*, restricted, is described externally as punctate and *Doleroides* as impunctate. Billings' species *Orthis gibbosa* from Ottawa is made the type species of the genus *Doleroides*.

There are two forms at Westport and throughout the Ottawa valley. The more common form has, heretofore, always been identified as *Piono-*

dema subæquata (Conrad). Billings' much rarer species *Orthis gibbosa* has been considered as a variety of the more prolific form. Cooper has shown that Conrad's *O. subæquata*, the original type of the genus *Pionodema*, is a punctuate form. Therefore it becomes necessary to take both these forms out of that genus and place them under Cooper's new genus *Doleroides* which is impunctate. Since *Pionodema subæquata gibbosa*, the form which has heretofore been considered a variety, has been made the type of the new genus, the impunctate form found in the Ottawa valley, heretofore indentified as *Pionodema subæquata*, has been left without a name, although it is one of the most prolific of fossils. It is intermediate between *D. pervetus* and *D. gibbosa*. Because it seems more closely allied to the former, it is here called *D. pervetus ottawanus*.

D. pervetus ottawanus n. var. is not so transverse in outline as the species of which it is a variety. It averages somewhat smaller, and, the fold and sinus being less pronounced, the anterior margin is more uniformly rounded. The variety has a greater tendency to develop more or less pronounced concentric growth lines than is shown by the illustrations or the few specimens of the species, which have been examined. This, however, is a somewhat variable feature.

In outer form *D. pervetus ottawanus* is very similar to *P. subæquata* but the latter is punctate.

It is less gibbous and more transverse in outline that *D. gibbosus* (Billings).

Horizon and Locality:—Black River: Leray. At many localities in the Ottawa and St. Lawrence valleys.

The type of this variety has been taken from the collections from Rockland, Ont., because the specimens are better preserved there than the Westport specimens.

Types. National Museum of Canada, Ottawa: holotype, Cat. No. 6727; paratype, Cat. No. 6727a.

Super-family. . .*Strophomenacea*

Sub-family. . . . .*Rafinesquininæ*

Rafinesquina rugosa var. *avita* n. var.

Plate II, Figurs 6-13.

The following description is based upon a number of shells from the Westport locality and some interiors from Mechanicsville, Ottawa.

The variety has the same shape and general proportions as the original species, but is considerably larger. A moderate sized specimen measures 16 mm. in width at the hinge line and 11 mm. in length, as compared with 10.1 mm. and 7.1 mm. respectively in *R. rugosa*[1]. One large specimen of the variety attains a width of 18 mm. and a length of 13 mm.

The pedicle valve of the variety has a greater degree of convexity in the anterior portion. No interior of the species was found. Some of the Ottawa specimens of the variety show a worn interior with widely divergent dental plates and the faint outline of a small flabellate muscle scar. Anteriorly the muscle scar is shallowly impressed. Posteriorly the separation between the right and left scar is continued to the beak, and the median septum has a course between the thickened tips of the scar impressions. In *R. alternata* according to Hall and Clarke[2], the posterior ends of the two scars united and the septum passes under them.

The brachial valve of the variety externally is similar to the species in form, but differs in size. The concavity of the brachial valve is developed to a less degree than the convexity of the pedicle valve. This difference is more marked in the variety than in the species. A strong, double cardinal process projects posteriorly. The delimitation of the dental sockets is only faintly exhibited. There is a very long, fine median septum, joined anteriorly by the thickened edge of the muscle scars, so that it appears to be pronged, in some cases. On either side of the septum is a linear scar impression, the outer edge of which is bounded by a ridge curving very slightly towards the septum posteriorly as well as anteriorly. A few specimens show another indefinite ridge outside the better defined margin of the linear scar. In many specimens the anterior and posterior region of the interior features were worn away, leaving the central part of the septum and the two limiting ridges of the muscle scar standing out like three almost parallel threads.

The method of striation varies. Some specimens occasionally have one or two larger striæ among the finer ones. Others have a more or less regular alternation of one finer stria between two coarser ones, again others have several finer ones between two coarser ones. The brachial valve more than the pedicle shows a tendency toward a regularity not an alternation of the fine striæ. Many of the pedicle valves exhibit small irregular corrugations anterior to the greatest convexity of the pedicle valve. A few brachial valves have this feature but in a less marked degree. The greater number of specimens are perfectly plain across the hinge line. On both valves, however ,a few have short but well defined

[1] Wilson, Geol. Surv. Canada, Bull. 33, p. 51, pl. 3, fig. 8, 9, 1921.

[2] Hall and Clarke, Pal. N.Y., VIII, pt. 1, pl. 8, fig. 10, 1892.

crenulations on the cardinal extremities. A very few carry the crenulations in to the beak.

No interior of *R. rugosa* has been found for comparison. The differences between the variety and species are: the variety averages larger in size, shows a tendency towards crenulations at the hinge line, which ornamentation the species develops to a striking degree, though the crenulations of the latter are broken making the whole surface remarkably rugose. Some of the larger more robust specimens of the variety exhibit gentle radial corrugations near the anterior margin, which are not present in the species, a smaller form. It may be a development of the gerontic stage of the variety.

The variety, then, in general, is a simple shell with regular striations. It has developed alternation of striation, in a varying degree. It has developed the crenulations of the cardinal region of the shell in a varying degree, and in a few cases exhibits a very slight tendency to irregular rugose ornamentation upon the body of the shell. The species has established all these characteristic to a marked degree. Therefore, it is considered that the variety is the forerunner of the species.

Horizon and Locality:—Black River: Leray. Lot 10, Con. 8, N. Crosby tp., Leeds Co., Ont., and Mechanicsville, Ottawa.

This form appears at a horizon immediately below the Trenton:Rockland beds in which the species *R. rugosa* occurs, which fact supports the interpretation that the variety is biologically antecedent to the species.

National Museum of Canada, Ottawa: holotype, Cat. No. 6813; paratypes in the private collection of W. Sinclair, Ottawa.

Super-family. . .*Pentameracea*
Family. . . . . *Porambonitidæ*

Camerella panderi Billings

Plate II, Figures 1-5

In commenting upon Billing's two species *Camerella panderi* and *C. volborthi*, Hall and Clarke[1] remark: "There may be reason to doubt if there is a valid specific difference in these shells, as both the Canadian specimens and examples from the Trenton limestone of New York (Jacksonburg), afford a series passing from the typical plicated form of one to the non-plicated form of the other". On Plate LXII, fig. 17, of the work cited, the joint authors have figured a section across the region of the beak of *C. volborthi*, but no interior is given of *C. panderi*.

[1] Hall and Clarke, Pal. N.Y., VIII, pt. 2, p. 220, 1894.

In the collection of fossils from southwest of Westport is a small species of *Camerella* which externally resembles *C. panderi* in form and striation. There are present a few specimens which are twice the size of Billing's type of *C. panderi*. Other specimens are the same size, though in some cases they are less gibbous than the types. These small variations are not of specific value, larger specimens might have been found at the type locality.

An examination of the interior, however demonstrates that Billings was correct in making two species of *C. volborthi* and *C. panderi*. Ground sections of the pedicle valve of the Westport specimens of *C. panderi* show that the base of the spondylium has a slight curve, the free edges, extending towards the visceral mass of the organism, curve inwards to a small degree in the nepionic stage. They become straight, and the base of the spondylium becomes more angular in the neanic stage. In the adult stage the edges of the spondylium curve outward very slightly. The drawings, on Plate II, show the various stages and the restoration represents the spondylium in the three dimensions. *C. volborthi*, as illustrated by Hall and Clarke, maintains a pronounced curve at the base of the spondylium below the straight wide divergence of its sides.

The sections of the interior of the brachial valve were only a partial success. The inrolling of the cardinal edges confuses the clear definition of the median septum and the crural plates. Several specimens show fragmentary pieces of shell in the interior which probably are parts of the crural plates.

The shell structure is so strikingly fibrous, that under a hand lens the fibres resemble striæ. The outer surface, however, lacks striation.

A few specimens exhibit faint concentric growth lines.

Horizon and Locality:—Black River: Leray, Lot 10, Con. 8, N. Crosby tp., Leeds Co., Ontario.

National Museum of Canada, Ottawa: plesiotypes, Cat. No. 6812.

CORRELATION

In the Westport area the appearance of *Tetradium syringoporoides* in impure limestone layers above the shale beds, in the same locality as the forms described above, is identical with its occurrence in beds in the Ottawa Valley. The question of the Pamelia, which this occurrence introduces, will be discussed elsewhere.

There was no fossil found indicating a Lowville horizon, though a search was made for its typical form *Tetradium cellulosum*. A great deal of the district is covered, and there is room for it verti-

cally between the exposure of the Pamelia and that of the Leray.

The upper beds, the Leray, of this limited inset of rocks may be correlated with the upper Black River as it appears at Ottawa. *Doleroides* sp. and *Gonioceras anceps* Hall are common to both localities. The recent finding of *Rafinesquina rugosa avita* n. var. at Ottawa still further strengthens this correlation. Two rather unusual forms found in Westport rocks have also been found in the Black River beds at Paquette Rapids, about sixteen miles below Pembroke. In the Westport locality the small brachiopod *Camerella panderi* is very abundant in association with *R. rugosa avita*. Paquette Rapids is its type locality. It has not been recorded from Ottawa. There is a somewhat gritty layer at Westport which lies a few feet below the bed in which *R. rugosa avita* and *Camerella panderi* are so abundant. In these gritty layers there is a small pelecypod which has been identified as *Modiolopsis nais* Billings. This form, also, was first described from Paquette Rapids. It appears evident, then, that deposition was contemporaneous at Westport, Ottawa and Paquette Rapids.

EXPLANATION OF PLATES

Except where otherwise stated all forms are natural size.

PLATE I

BEEKMANTOWN AND BLACK RIVER FORMS

BEEKMANTOWN

1. Problematic form with rhomboid mesh. Nat. Mus. Canada, Ottawa: holotype, Cat. No. 6811a.

2. Cystid-like form. x 2. The form can be seen natural size on fig. 1. Nat. Mus. Canada, Ottawa: holotype, Cat. No. 6811b.

6. Tubes. Nat. Mus. Canada, Ottawa: holotype, Cat. No. 6810.

BLACK RIVER

3. *Doleroides pervetus ottawanus* n. var. Pedicle valve. x 1½. Nat. Mus. Canada, Ottawa: paratype, Cat. No. 6727a.

4. The same. Another specimen, brachial valve. x 1½. Nat. Mus. Canada, Ottawa; paratype, 6727b.

5. The same. Another specimen. 5a, brachial valve, showing the projection of pedicle valve beyond it; 5b, profile view of the same specimen. x 1½. Nat. Mus. Canada, Ottawa: holotype, Cat. No. 6727.

PLATE II

BLACK RIVER FORMS

1. *Camerella panderi* Billings. 1 a-d. Drawings of the spondylium of a pedicle valve showing its development. x 2.

2. The same. 2 a-d. Drawings from a brachial valve. x 2.

3. The same. The interior of the beak of a pedicle valve reconstructed by grinding specimens down, showing the whole development of the spondylium. x 4.

4. The same. Pedicle valve. x 2. Nat. Mus. Canada, Ottawa: plesiotype, Cat. No. 6812.

5. The same, showing the fibrous shell structure, x 4. Nat. Mus. Canada, Ottawa: plesiotype, Cat. No. 6812a.

6. *Rafinesquina rugosa avita* n. var. Diagrammatic representation of the pedicle muscle scar. Collection of W. Sinclair, Ottawa.

7. The same. x 2.

8. The same. Pedicle valve. x 2. Nat. Mus. Canada, Ottawa: holotype, Cat. No. 6813a.

9. The same. Showing the prong-like effect at the anterior of the septum. Collection of W. Sinclair, Ottawa.

10. The same. An exfoliated brachial valve, showing the strong edges of the scar. Collection of W. Sinclair, Ottawa.

11. The same. Brachial valve, showing the projecting cardinal process. x 2. Nat. Mus. Canada, Ottawa: paratype, Cat. No. 6813c.

12. The same. Diagrammatic drawing, showing the relation of the projecting cardinal process, the muscle scars, and the prong-like anterior of the septum.

13. The same. Exterior of a brachial valve. x 2. Nat. Mus. Canada, Ottawa: paratype, Cat. No. 6813b.

14. *Doleroides pervetus ottawanus* n. var. Mould of interior of a pedical valve. x 1½. Collection of W. Sinclair, Ottawa.

15. The same. Mould of interior of a brachial valve. x 1½.

"ROCHES MOUTONNEES" NEAR KALADAR, LENNOX AND ADDINGTON COUNTY, ONTARIO[1]

By M. E. WILSON

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IN MANY places throughout the Canadian Pre-Cambrian Shield the bed-rock surface outcrops in successive smoothly rounded hummocks which because of a fancied resemblance to the backs of a flock of sheep are known as "roches moutonnées" or sheep rocks. These peculiar forms can be observed in numerous localities along railways and roads traversing the Laurentian highlands of Ontario and Quebec, and are especially well developed along the new Ottawa-Sarnia highway which lies in the highland between Perth and Madoc. A typical example of "roches moutonnées" in this region, near the village of Kaladar in Lennox and Addington county, Ontario, is shown in Figure 1.

These "roches moutonnées" are believed to have been formed by the great continental glacier, the ice of which under its accumulated weight moved southward wearing down the bed-rock surface to its present smoothly rounded, hummocky condition. Because the movement of the ice was from north to south the hummocks are usually very gently sloping on the north side and more abruptly terminated on the south. As the climate moderated, the great ice mass not only ceased to advance but gradually melted away leaving the smoothly rounded hummocky bed-rock surface, partly exposed, partly buried by rock debris, as we see it to-day.

The "roches moutonnées" near Kaladar (Figure 1) adjoin the Addington road about five miles south of the village at a point where the road crosses an extensive high area of granite. This area is only sparsely wooded and continuous "roches moutonnées" can be seen for many miles in every direction.

FIGURE I—*"Roches Moutonnées" near Addington road, five miles south of Kaladar, Lennox and Addington county, Ontario.*

AMERICAN ORNITHOLOGISTS' UNION MEETING IN QUEBEC

AT THE invitation of the Department of Colonization, Game and Fisheries of the Province of Quebec and the Provancher Society of Natural History of Canada, the American Ornithologists' Union, which is the principal ornithological organization on the North American continent, including many members in Canada as well as in the United States, will hold its next annual meeting in Quebec City during the week beginning October 16, 1932. Headquarters will be in the Chateau Frontenac Hotel and the public sessions, which will be held in Laval University, will begin on October 18th and continue until the afternoon of October 20th. On Friday, October 21st, the meeting will conclude with an excursion by motor bus to the vicinity of Cap Tourmente, about thirty miles east of Quebec, where large flocks of the rare and beautiful Greater Snow Geese will be seen during a pause in their migration.

The Annual Meetings of the A.O.U. are well known to many of our readers as intensely interesting and valuable occasions, when not only professional scientists, but all classes of those who are interested in our native birds, including the veriest amateurs, get together in very informal fashion to spend several days in considering matters relating to birds, and in making and renewing personal acquaintances and friendships. The Annual Meeting of the Union was held in Ottawa in 1926, when there was a large Canadian attendance, and it is to be hoped that the Quebec Meeting, which will be the second meeting of this Organization in Canada, will be even more successful. Apart from the attractions of the meeting itself, Quebec City is always an especially interesting place to visit and readers of *The Canadian Field-Naturalist* who are interested in birds and who can possibly arrange to be in Quebec at the time of this Meeting, should plan now to do so.

A FEW BIRD RECORDS FROM THE ARCTIC

By L. T. S. NORRIS-ELYE, B.A. (Cantab.)

TOWARDS the end of 1931 I received from Mr. Hugh Conn a consignment of birds obtained by him during his recent travels on behalf of The Hudson's Bay Company, of which he is Chief Inspector. The table shows the birds received, with date and place of capture.

In some cases sexing was omitted at the time of skinning; in other cases specimens were preserved by formalin injection.

The blue goose was shot by an Eskimo with a rifle as he had never seen one like it. West coast specimens are few and this one is a Manitoba record, Nunalla being some 75 miles north of Churchill and barely 2 miles south of the Manitoba boundary. The salted skin is being mounted, although the bullet removed one wing completely.

The turkey vulture appears to be another record. Mr. P. A. Taverner writes me that it is far north of any record he has, the nearest being Hudson Bay Junction, Sask., the north end of Lake Winnipegosis and one at Moose Factory on James Bay.

Mr. Conn has made a rather remarkable debut in Ornithology, as he was not particularly interested until about two years ago. The other specimens are of interest only to myself, as they are in summer plumages and are somewhat hard to obtain.

Date	*Place*	*Species*	*Sex*
1931. August 5.	Tavane, N.W.T.	*Somateria mollissima borealis*	F.
1931. August 3.	" "	*Somateria spectabilis*	F.
1928. July (?).	Nunalla, Man.	*Chen cærulescens*	?
1931. August (?).	Fort Severn, Ont.	*Cathartes aura septentrionalis*	?
1931. July 28.	Padley, N.W.T.	*Lagopus rupestris*	F.
1931. August 31.	Chesterfield, N.W.T.	*Sterna paradisea*	F.
1931. August 26.	" "	*Charadrius semipalmatus*	?
1931. August 20.	" "	*Ereunetes pusillus*	?
1931. August 20.	" "	*Plectrophenax nivalis*	F.

CONTRIBUTIONS TO THE KNOWLEDGE OF EXTREME NORTH-EASTERN LABRADOR

By BERNHARD HANTZSCH
TRANSLATED BY M. B. A. ANDERSON

"Beiträge zur Kenntnis des nordöstlichsten Labradors," von Bernhard Hantzsch, *Mitteilungen des Vereins für Erdkunde zu Dresden*. Dresden, Volume 8, 1909, pp. 158-229, Volume 9, 1909, pp. 245-320.

(Translated from the original German text in the Library of Congress, Washington, D.C., by M. B. A. Anderson, M.A., Ottawa, 1928.)

Original pagination given in the text.

(*Continued from Page 116*)

Besides the grave mounds which are often visible from a long distance, here and there stone columns built up in layers are also encountered, which in some cases represent memorial monuments, but usually are only landmarks and guide marks. To be sure the Eskimos do not seem to have learned this custom first from the whites, but in the discovery of such a "stone man" you are never sure whether it really originates with the natives. In none of the columns investigated by me could I discover any sort of contents.

[P. 299]

In the family and community life of the Eskimos since old times certain customs concerning right and wrong were the standard. It is, however, at present difficult to study these fully since the population as already repeatedly remarked, are in a transition stage from the heathen to a Christian state and much that was practiced earlier is now no longer a custom. With sufficient acquaintance with the people and their speech one would perhaps in spite of this be successful in obtaining enough accurate information concerning the customs which are fast disappearing; unfortunately this was possible for me only in a slight degree. No real penal law exists among the natives themselves, nor has any attempt been made by the whites to introduce such a law. To begin with, every grown Eskimo is entirely free and dependent on no one. Even if he did not hold to the ancient customs of his people, they would hardly take measures against him. This state of affairs is possible only in a land which is populated so sparsely, but it affords at the same time the best proof of the peaceful and harmless character of these people, who, as a rule, live lawfully even without laws. The view of the missionaries, that this condition is a fruit of their Christianization cannot be agreed to without further consideration, especially since many heathen, Central Eskimo bands cut off from the outside world, are in no way less peaceable, but it might be maintained of the Killinek people that they are worse people than the Christian. The fact that the first visitors and missionaries in Labrador were received as enemies by the natives, might perhaps be explained by their unfortunate experiences with other strangers, whoever they might have been, Indians, whites and other peoples, and with their usual fear of the new and unknown. It is true that their regular association with white people, principally the mission work itself, exerted a quieting effect on the native population. In the home the father of the family is the undisputed master, but as a rule he exercises his authority kindly and leaves the supervision of the girls especially to the mother. The housewife governs independently as a rule in domestic affairs. [P. 300] In the larger circle of relatives, as already mentioned, the oldest man possesses the right of decision in important matters, but hands this over to a younger person, when, with advancing age, he declines in mental and physical strength. A sharply defined law of inheritance does not exist in the restricted communal family life, especially as most of the possessions of the dead in earlier times were placed in the grave. To-day the nearest relative and oldest male descendant of the dead man has the chief claim to the inheritance, and on him, of course, the duty of looking after the other survivors especially the widow and any unmarried daughter, over whom he then has a sort of paternal authority, descends. This custom, which is in no way strictly carried out, might take its rise from the simplest natural laws, but be somewhat more developed through the influence of the whites. Specially capable men, in many cases, understand how to secure a certain lordship over the other members of the band. There is no real position of chief at all. All are equal. In order to procure esteem, they frequently made use of the oddest means and the more remarkable the pretended sorceries, so much greater the honour. But it must be said that such a sorcerer (Angakok) won true regard only when he was successful and able in his other undertakings. Such Angakut occupy the position of priests and physicians and as such occasionally received gifts, and perhaps appropriated to themselves things which in fact were put out for the dead. Actual fees or other charges seem never to have been the custom, and even to-day the population is still entirely free from direct payments. In the customs prevailing at births,

marriages, deaths and other such occurrences the Killinek Innuit may have agreed with the bands living to the north and west. At present the old customs are apparently little observed. From the standpoint of native culture crime did not occur too frequently, because slight opportunity was offered for it. [P. 301]

Killing children and old people or other such actions, which are bad according to our laws were, to be sure, not seldom practiced but were not considered in any way wrong. Malicious and secret murders, especially committed on men who were their equals, because of a grudge, hate or jealousy, were the only ones considered very serious. The relatives of the murdered man, up to recent times, considered themselves bound by obligation to blood revenge. This was the only natural way of punishment and self-defense which existed in the completely lawless band, but was also the cause of bloody deeds continued for decades, which often ended in the extinction of whole families. Here the Christian influence has quickly proved to be a blessing; for at present in this population the blood revenge is probably seldom exercised. The last case of which I heard was some years back. The murderer, who no longer felt safe in the Killinek neighbourhood, took flight from the avenging hand by daring the dangerous passage across Hudson Strait to south-eastern Baffin Island with his family. He finally reached Cumberland Gulf safely and settled down there. Our people learned of this journey through some Eskimos from that locality, who came to Killinek some time afterwards in a ship's crew. Meanwhile the influence of the mission's work had cleared their minds. They begged me, therefore, in case I ever should visit Cumberland Sound and should catch sight of the man from Killinek, to say to him that there was no more enmity against him and he could return undisturbed with his family to his own people. The Eskimo has just as much family as home interest.

At present the personal security of the natives is increasing; their personal freedom, however, goes back to the founding of the mission and trading station. This settlement of Killinek is, as already represented, the only one on the whole north-east tip of Labrador. The nearest neighbouring stations are Hebron on the Atlantic coast and George River in the south-east of Ungava Bay. A married missionary, Mr. S. Waldmann, is in charge at Killinek. Assisting him especially in the trading are an unmarried younger [P. 302] member of the brotherhood, Mr. M. Merklein, as well as a married half-Eskimo, S. Voicy. In addition, a married couple of half-breeds named Lane live in this district; all the other inhabitants are Eskimos. It would go beyond the limits of this work were I to discuss the activities of the mission in the country in greater detail; this happens not because of underestimation of their significnat work. Moreover, it is obvious, not only that missionary and ethnographer occasionally are opposed to each other in their views, but also that the mission service places extraordinarily high demands on personality, in religious as well as in general respects. A missionary up there should understand everything that comes under consideration both in its theoretical and practical aspects. He ought to be a spiritual leader, teacher, physician, linguist and a hundred other things. He has to understand the varied kinds of trades, as well as all possible handicrafts, perhaps even handling a ship, hunting and fishing. It is only in an exceptional case that outstanding men are capable of satisfying all the demands of their difficult calling, and it does not mean any disparagement of their personalities, if here and there I act as critic. I well understand, how in the distant districts, far from mental inspiration, the human being can easily become a one-sided fanatic in certain respects. On the other hand I have often truly admired the versatility in knowledge and ability of our missionaries, and without adding anything further, that the capacity for work in special lines must suffer through the manifold demands made upon them. In addition it would be false to represent the missions as such and activity of different missionaries as equal. The sharp judgment of Nansen, that he expresses in his "Eskimo Life" about the mission work I did not find in the least true for Labrador. To be sure the considerable outlay does not appear to me in proportion to the results achieved. The Eskimo lives safely without the extensive activity of the missions, if only suitable protection is afforded him by the government of the land, in much more favourable conditions than countless people here at home, and missionaries who out of pure enthusiasm go out to their field without any sort of payment, suffering separation from culture and from family, living only with and for their heathen brothers [P. 303] may have been quite rare. The Labrador missionaries are the spiritual and worldly masters of their communities and often express this very plainly. To well-behaved people they give service, support and help. If they fall into disfavour the missionaries can harm them a great deal, most of all by withdrawing permission to trade. This usually happens only with criminals and represents a punishment scarcely to be endured to the people who have become accustomed to munitions and

other foreign needs. They try to raise this ban by promises as soon as possible. In consequence of this, I met among the natives, much hypocrisy and sham piety for the missionaries' benefit, and many an Eskimo, who is represented in the mission reports as a pious and converted Christian, is nothing but a very clever hypocrite. Indeed very few of the Labrador Eskimos have any understanding of the true blessing of Christianity; in the case of the Killinek people such an understanding does not yet seem to be awakened in spite of their initial enthusiasm for the cause. One evening when I had invited to my house perhaps ten persons, men and women and, with the help of the interpreter through Mrs. Lane, had been conversing animatedly with them for hours, I put the question to them, whether they had bettered themselves by the work of the white people, or would they prefer to have the old times back. They conducted a serious and lively debate, were silent at last, and the oldest woman began to speak in order to explain to me the result of the discussion: "We are now well off in a different way than before; before we had more seals and caribou, now we have tobacco and tea." As a rule they are shy in front of pious and rich strangers, who live in a house so much larger than theirs; if you come into closer contact with them, the oppressive feeling of inferiority and dependency seldom passes away. A few days before my journey out to Labrador it was pointed out to me in London that I would find it hard to get a place in the crowded mission buildings of Killinek. When I rejoined, then I would be just as glad to live with the Eskimos, it was explained to me that it would be impossible to permit this. Greatly surprised I inquired [P. 304] the reason for the claim, because I was of the opinion that the missionaries spent much time in the houses of their communicants, whereupon I was told that living with the natives would be impossible, because—if they might be permitted to speak so plainly—I might bring vermin into the mission house.

(To be continued)

NOTES AND OBSERVATIONS

HYBRID GROUSE.—Mr. P. A. Taverner's description of "A New Hybrid Grouse" (Annual Report, 1930, Natural Museum of Canada, pp. 89-91, 1932, Distributed April 4, 1932) *Lagopus lagopus* (Linnæus) x *Canachites canadensis* (Linnæus) is of much intesest to the writer as one of my northern correspondents, Mr. Arthur Santmier, wrote to me under the date of Dec. 2, 1929, as follows;—"On Nov. 16th I saw a remarkable bird at Indian camp just this side of Cape Tatnam, down the eastern coast. It was a cross breed of grouse. I was unable to secure the bird or its skin as the Indians who had killed it were very jealous of it. I was able to snatch a few feathers and a part of a wing and am enclosing them to you. . . . The bird is a grouse with all the characteristics of a Canada Grouse or Spruce bird, head, bili, feet and its crop filled with the same material. It was in a spruce tree feeding with spruce grouse when shot and yet is most wonderfully coloured in black and white and mottled grey with some brown. Its general appearance was that of a silver spangled Hamburg domestic fowl. It was very clearly a cross between the Canada Grouse and the Willow Ptarmigan."

The Ven. Archdeacon R. Faries of York Factory, from whom the skin described by Taverner was procured, mentioned that he had heard about this Cape Tatnam bird. There can be little doubt that the feathers and part of a wing secured by Mr. Santmier were from the bird referred to by Mr. Faries.

I sent the feathers and wing portion to Mr. Taverner who informs me they are identical in appearance with the specimen now in the National Museum.—B. W. CARTWRIGHT.

A CORRECTION CONCERNING RECORD OF *Neotoma c. drummondii* FROM KITCHENER, B.C.—In a report (Mailliard, J., *Proc. Calif. Acad. of Sci.*, Fourth Ser., vol. XX, no. 8, pp. 269-290), written in 1931, upon some field work carried on in the Kootenay region of southeastern British Columbia in 1928, a wood rat taken near Kitchener was (erroneously) recorded as *Neotoma cinerea drummondii*. Upon the appearance of this paper (January, 1932) Dr. R. M. Anderson, Chief, Division of Biology, National Museum of Canada, Ottawa, questioned the identification. Following this, the curator of the Department of Mammalogy of this institution sent to Dr. Anderson the two specimens taken near Kitchener. They were identified by Dr. Anderson as *N. c. occidentalis* as I had originally supposed them to be, and under which name I meant to record them in the above paper. As no explanation of my inadvertence in this case would help the matter, I simply acknowledge the oversight and apologize for it.—JOSEPH MAILLIARD. *California Academy of Sciences, San Francisco, Cal.*

LEAST WEASEL *Mustela rixusa* (Bangs) IN ONTARIO.—On January 20th, 1932, I received from Mr. Ernest Winlaw, Heaslip, Ont., a fine specimen of this species—a female, pure white with the exception of a few black hairs on the end of the tail.

Heaslip is four miles from Engelhart, and a short distance north of Haileybury and Cobalt. It was captured about January 17th, and a request for further information from Mr. Winlaw has brought me the following particulars:—The territory, like so much of our northern "Clay Belt", has been thoroughy burned, and is now, largely, farm land. The weasel was caught in a ditch, the sides of which were originally shored up with timber to prevent sliding. Cavities in between, and behind those logs make ideal hiding and nesting places for mice, and, consequently, for small weasels also. The fill for the road being elevated, made the logs a necessity. When the weasel was caught, a field mouse was caught in the jaws of the same No. 1 trap, and it looked as though the weasel had been carrying the mouse when she sprung the trigger. The mouse was "as big around, and very nearly as heavy as the weasel".

Regarding former experiences with this species, Mr. Winlaw says:—"In the summer of 1929, I had some mouse traps set in my driving shed, where I had some grain, and the mice were thick and helping themselves, so I set some traps, and one morning on looking at the traps I found a weasel in one, just about the size of a big field mouse, and I think it was a Bangs weasel, hardly full grown. Also, this fall I dug my potatoes and placed them in piles in the field and left them there for a while; and while bagging them up, I found that the mice had been helping themselves. One pit that I opened, when nearly all picked I thought I saw a mouse, and made a swipe at it and missed, when I saw it was a weasel. Mice had been in the pile, but apparently the weasel had killed them all, as it was the only heap with no mice. I had leather gloves on, so I cornered the weasel and when cornered he shewed fight like a true weasel, sank his teeth into the leather, so that I could lift him clear of the ground. This weasel did not seem near as alert and active as most of them, and I think it was another Bangs weasel, for it was only the size of a good big mouse, and since he seemed to be clearing up the mice, I let him go. It is well settled around here and most of the boys have traps out for weasels, and I hear of several of the tiny ones being caught this fall. Four years ago weasels were very plentiful, and some caught as high as 75 to 100 weasels in the season, and I never heard of one of the little ones, but this fall I hear of several, so they are increasing here. Mice are very plentiful so there is no shortage of food."

This weasel supplies the farthest south record for the species and the measurements of the specimen are: length, 175; tail, 29; hind foot, 19; weight, 31.5 grams, or 488 grains; about one and one-tenth ounces.—W. E. SAUNDERS.

AUTUMN EXCURSIONS OF THE OTTAWA FIELD-NATURALISTS' CLUB, 1932

OTTAWA MEMBERS PLEASE NOTE.—The endeavours of the Excursions Committee to provide an extended programme for the spring season of 1932 met with such approval as to justify an appeal for the support of two of the autumn excursions by providing transportation. Will those members, therefore, who own cars or know friends sufficiently interested, do their best to make the last two excursions in September a success?

SEPTEMBER 3.—Rideau River and Hog's Back. Take Bronson O.E.R. car, and meet at bridge over Rideau Canal, Bronson Ave., 3 p.m.—*Leader*—MR. C. M. STERNBERG.

SEPTEMBER 10.—Ironsides and vicinity. Take Hull Electric Railway car at Chateau Laurier for Wrightville at 2.30 p.m. *Leader*—MR. B. A. FAUVEL.

SEPTEMBER 17.—Chelsea Dam. Meet at Chelsea C.P.R. station at 3.30 p.m. Members unable to provide auto transportation for this and the following excursion, please communicate with the Convener, National Museum of Canada, Ottawa. *Leader*—MR. F. J. FRASER.

SEPTEMBER 24.—Wakefield. Meet at Wakefield C.P.R. Station, 4 p.m. *Leader*—MR. A. LAROCQUE.

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FURTHER NOTES ON THE AMPHIBIA AND MAMMALIA OF THE TEMAGAMI DISTRICT, ONTARIO

By A. F. COVENTRY

FURTHER work around the south end of Lake Temagami has brought to light some interesting additions to my list of 1931 (Coventry, 1931), and has added to our knowledge of forms already reported.

The specimens on which these notes are based are in the Royal Ontario Museum of Zoology. Measurements are given in millimetres; L. signifies total length; T., length of tail vertebræ; and H.F., length of hind foot.

Additions to the Original List

AMPHIBIA

Caudata

Eurycea bislineata bislineata (Green).—One immature specimen was captured on August 22 on the muddy shore of a small stream flowing through thick mixed bush. This is, I believe, the second occasion on which this form has been taken in Ontario; the earlier material was collected by E. B. S. Logier, of the Royal Ontario Museum of Zoology, through whose kindness I am able to refer to this unpublished record.

MAMMALIA

Insectivora

Sorex fumeus fumeus Miller. Smoky Shrew.—A single specimen was trapped on September 3 as it emerged from a crack at one end of a rock ledge a few feet above the base of a cliff, and about one hundred feet above lake level. L., 106; T. 44; H.F., 13.5; female.

Microsorex hoyi intervectus Jackson. Intermediate Pygmy Shrew.—Two specimens were taken at the same place as the Smoky Shrew, one on August 17, the other on September 1. The sex of the earlier specimen was not determined, the latter was a female. The average measurements were: L., 82.5; T., 30; H.F., 10. Neither this animal nor the preceding can be common, for the immediate neighbourhood was extensively trapped without yielding another specimen of either, and none have been taken elsewhere round the south end of the lake.

Rodentia

Synaptomys cooperi cooperi Baird. Cooper Lemming Mouse.—This form was taken in two sites; on July 2 in a sphagnum belt overgrown with Black Spruce where a typical Kalmia bog passes into the mixed bush of the surrounding higher land, and on August 12 in a small patch of sphagnum in rather open mixed bush. Only three specimens were taken in all; average measurements: L., 108; T., 17.3; H.F., 17.3.

Notes on Forms already reported

AMPHIBIA

Caudata

Triturus viridescens viridescens (Rafinesque). Newt.—A rather dull-coloured land form was collected under a log on August 5. This is the second specimen I have seen in the Temagami area.

MAMMALIA

Insectivora

Sorex palutris albibarbis (Cope). White-chinned Water Shrew.—Two specimens were taken by the stream that yielded *Eurycea;* this is on the east side of the lake near its outlet, and is about eight miles in a straight line from the site previously recorded on the west side. Average measurements of the two, both females, were: L., 143; T., 67.5; H.F., 18.7.

Rodentia

Tamias striatus lysteri (Richardson). Lyster Chipmunk.—Taken in three new sites round the south end of the lake. The average measurements of two males and three females were: L., 335; T., 94.5; H.F., 34.8.

Eutamias minimus borealis (Allen). Northern Chipmunk.—Hitherto only a sight record, it is now represented by four males and one female from two sites on opposite shores of the lake. Three were trapped on a sandy beach, one was trapped on a ledge part way up a steep cliff, and one shot on the talus at the foot of this cliff

Average measurements: L., 200; T., 89.9; H.F., 31.1.

Glaucomys sabrinus macrotis (Mearns). MEARNS FLYING SQUIRREL.—The Flying Squirrel of this area was reported in my previous communication (1931) as *Glaucomys s. sabrinus* (Shaw). Ten additional specimens, sub-adults and adults caught in mid-September, give data which seem to compel reference of the Temagami form to *macrotis*. The average body measurements, taken in the flesh, were: L., 264 (248-272); T., 117.5 (111-131); H.F., 35.8 (33-39). These are all smaller than the averages given by A. H. Howell (1918) for *macrotis*, and much smaller, therefore, than those for *sabrinus*. The skull measurements, based on eleven specimens of this species are: greatest length, 38.4 (36.2–40.5), zygomatic breadth, 21.8 (21–24.5); mastoidal breadth, 17.6 (16.8–18.6); least interorbital breadth, 7.5 (7.0–8.4); least postorbital breadth, 8.6 (8.0–9.2); length of nasals, 10.0 (8.5–10.8). These dimensions are, except mastoidal and least interorbital breadths, smaller than the averages for *macrotis;* the mastoidal is the same as that given by A. H. Howell for *macrotis*, while the interorbital is larger (7.5 and 6.9). The skulls of my specimens show a greater range of variation than those described by A. H. Howell, *e.g.*, the extremes of greatest length are separated by 2.7 mm. in his material, by 4.5 mm. in mine; of zygomatic breadth by 1.6 and 3.5; of mastoidal breadth, by 0.8 and 1.8; of nasal length, by 1.5 and 2.3. This is perhaps an indication that the form is near the limit of its range.

Microtus pennsylvanicus [*fontigenus* ?] (Bangs). MEADOW MOUSE.—The only *Microtus* of the *pennsylvanicus* group hitherto reported by me is an immature specimen caught in 1929 and assigned to the above-named form. In 1930 none were taken, but in 1931 seven specimens were added to the collection from three different sites, one a large island, the other two on the mainland. Six were females with the following average dimensions: L., 139.7; T., 42.8; H.F., 17.2. The male was a very large animal; L., 177; T., 54; H.F., 22. The occurrence of this large individual seems to raise the question of the form to which the Temagami material should be assigned. This specimen, caught along with others ranging closely round the average for the area, exceeds in bodily dimensions the averages given by Bailey (1900) for *Microtus p. pennsylvanicus*, and he describes *M. p. fontigenus* as being smaller than *pennsylvanicus* by about twenty millimetres in the total length. In the hope of elucidating the matter, I have examined skulls from specimens collected round Abitibi, reported by Snyder (1928) and at Long Point, Lake Erie, reported by Snyder (1931), as well as from Temagami, three places very nearly on the same meridian. The comparison of these three groups of specimens is shown in the table:—

	BODY		SKULL							
	Length	Tail	H.F.	Greatest Length	Nasals	Zygomatic Breadth	Diastema	Incisive foramen	IF×100 / Diastema	Nas.×100 / Greatest Length
Abitibi...	157.5	42.5	19.5	25.9	7.1	15.0	8.2	5.0	61.0	27.4
	(177)	(50)	(21)	(27.3)	(7.8)	(16.0)	(8.8)	(5.6)	(67.5)	(28.5)
Temagami	145.8	44.5	19.9	26.3	7.3	13.9	7.4	4.7	63.5	27.7
	(177)	(54)	(22)	(30.0)	(10.0)	(15.8)	(8.2)	(6.3)	(76.8)	(33.3)
Long	185.6	54.0	21.2	29.3	8.4	17.0	9.4	5.4	57.5	28.6
Point	(201)	(61)	(23)	(30.0)	(9.0)	(17.2)	(9.7)	(5.8)	(59.8)	(30.3)

The figures in brackets are the maximum value of the measurement in question.

In a general way, there is a decrease in bodily and skull size northwards; while, however, the average measurements of the Temagami and Abitibi material agree fairly well with those given for *fontigenus*, the occasional occurrence of much bigger specimens makes this ascription open to question, especially since it seems probable that only a small proportion of *Microtus* live to attain their maximum size. The skull characters throw further doubt on the matter. While the average greatest length clearly increases southwards the largest skulls from Temagami and Long Point are the same size. The nasal region, considered as a percentage of the greatest length, increases slightly towards the south, but the longest rostrum examined occurs in the biggest skull from

Temagami. The proportions of the incisive foramina are even more confusing; expressing the length of the foramina as a percentage of the length of the diastema, we find the longest from Temagami, followed by Abitibi and Long Point, in that order. Bailey (1900) writes "The short rostrum, wide braincase, and short incisive foramina distinguish *fontigenus* from both *pennsylvanicus* and *drummondi*, with both of which it seems to intergrade", and again, in his description of *pennsylvanicus*, "incisive foramina long, occupying two-thirds of the space between the molars and incisors". Comparing these accounts of features considered diagnositc with the measurements of the material under discussion, it appears that while the data for the rostrum are inconclusive, those for the incisive foramina make the more *pennsylvanicus*-like skulls come from the more northerly sites. It can, however, hardly be doubted that the Long Point form is *M. p. pennsylvanicus*, despite the short incisive foramina, for that region is well within the boundaries of the area occupied by this form.

The implication seems to be that the range of *Microtus p. pennsylvanicus* in Ontario may have to be extended far into the Canadian Zone, instead of being limited, in a general way, to the Transition. It may be recalled in this connection that Dr. H. T. Jackson identified a specimen from the Lake Nipigon district as "*Microtus p. fontigenus* approaching *pennsylvanicus*" (Dymond 1928).

Microtus chrotorrhinus chrotorrhinus (Miller). YELLOW-CHEEKED VOLE.—Taken in three new sites, fairly separated. The average measurements of four undoubtedly mature specimens were: L., 156.2; T., 43.7; H.F., 20. It seems clear that this form occupies any site in the area where it can find suitable conditions; these, to judge by present data, involve as essential loose rock, which may be bare of vegetation and in the open—as talus below a cliff—or overgrown with moss and under bush of various densities.

In conclusion I desire to thank the Staff of the Royal Ontario Museum of Zoology for helpful discussion of a number of points and for their kindness in allowing me to consult the collection which is in their care.

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MAMMALS OF THE RIDING MOUNTAIN NATIONAL PARK, MANITOBA

A Compilation of Field Notes and Observations

By H. U. GREEN

FEW SECTIONS in Canada of easy access to civilization offer such interesting possibilities to the mammalogist as the area situated in central Manitoba known as the Riding Mountain National Park. From the densely timbered heights of the northern and eastern escarpments to the very grass roots of the marshy meadows and semi-open plains to the west and south, mammalian species are available for observation and study. In fact, it may be truthfully said that no area in the Dominion surrounded by an old established settlement supports such a wealth of animal life.

The Park consists of some 690,000 acres and was until recently set aside as a Dominion Forest Reserve. The northern and eastern escarpments, which reach a maximum elevation of 2,200 feet above sea level, and an average of 900 feet above the surrounding country, descend abruptly to alluvial fertile plains stretching towards Lakes Winnipegosis, Dauphin and Manitoba. The southern and western portions merge imperceptibly into a surrounding wooded plateau with a decided loss in altitude. The northern boundary borders the Transition and Canadian life zones. There is, therefore, an admixture of lesser mammalian species peculiar to each zone.

Of special interest is the prevalence within a small area of sub-species of *Peromyscus* and *Clethrionomys*. *Peromyscus maniculatus borealis* inhabits the forest regions on the northern escarpment, and *Peromyscus maniculatus bairdi* the semi-open terrain about the southern boundary. *Clethrionomys gapperi gapperi* is found about the

deciduous and coniferous growth of the northern escarpment, and *Clethrionomys gapperi loringi* along the sparsely wooded creeks to the south. There is no visible evidence of intergradation. The ecological barrier of separation has not yet been determined.

The field work necessary for this compilation occupied three years of intermittent study. Every mammal listed has been personally observed.

CHIROPTERA

Myotis lucifugus lucifugus (Le Conte). LITTLE BROWN BAT.—Female and one juvenile captured and examined. The specimens were found within the cavity of a hollow tree. The Little Brown Bat is quite common.

Entesicus fuscus fuscus (Beauvois). BIG BROWN BAT.—Several observed in flight. They are not plentiful.

Without doubt several other species of Bats common to Manitoba exist within the confines of the Park. Bats, though, are not only difficult to observe under twilight conditions, but hard to locate during the day.

INSECTIVORA

Sorex cinereus cinereus Kerr. MASKED SHREW.

Sorex arcticus arcticus Kerr. RICHARDSON SHREW.—Fairly abundant in favoured localities. Numbers have been captured.

Sorex palustris palustris Richardson. RICHARDSON WATER SHREW.—Abundant about streams and certain lakes and sloughs north of the height of land. None have been noted in the southern portion of the Park.

Microsorex hoyi hoyi (Baird). PIGMY SHREW.—Only five specimens were noted.

Blarina brevicauda brevicauda (Say). LARGE SHORT-TAILED SHREW.—*Blarina* is peculiar to the north and east slopes. None have been seen elsewhere in the Park area. Apparently their numbers are small.

Condylura cristata (Linnaeus). STAR-NOSED MOLE.—Three specimens only obtained. One during the early winter of 1930-1931. From characteristic signs it is evident that here and there in the moist places prevalent in the southern area of the Park the Star-nosed Mole abounds in reasonable numbers.

CARNIVORA

Ursus (Euarctos) americanus americanus (Pallas). BLACK BEAR.—The Black Bear is nowhere plentiful and is found only in the deep spruce forests on the northern and eastern escarpments of the mountain. Their habit of invading the adjoining settlements has resulted in much unnecessary slaughter. Except in parks and reserves the Black Bear is not seasonally protected in Manitoba.

Vulpes fulva regalis Merriam. NORTHERN PLAINS RED FOX.—A few specimens have been observed in the semi-open terrain near the western boundary. The Red Fox is not plentiful, in fact it may be considered comparatively rare.

Canis latrans nebracensis (Merriam). PRAIRIE COYOTE.—Prevalent in the open terrain and sparsely wooded areas in the southern portion of the mountain.

Canis latrans latrans Say. BRUSH WOLF.—An average number of these predators exist throughout the main wapiti range. In the spring of the year they are responsible for the destruction of many wapiti calves. From the size, colour and actions of numerous specimens observed they could easily be mistaken by a casual observer for timber wolves (*Canis nubilus*).

Martes pennanti pennanti (Erxleben). FISHER.—Some years ago Fisher were normally plentiful on the eastern escarpment of the Riding Mountain. Intensive trapping along the Park boundaries has resulted in serious decimation and few remain. Two have been noted.

Mustela cicognanii cicognanii Bonaparte. BONAPARTE WEASEL.—This weasel is quite numerous.

Mustela vison lacustris (Preble). HUDSON'S BAY MINK.—Fairly prevalent and well able to hold its own when afforded sanctuary.

Lutra candensis candensis (Schreber). CANADA OTTER.—It was reported that no otter had been seen in the Riding Mountain for many years. During the winter of 1930-1931 tracks were observed in the Whirlpool River district. In July, 1931, I was fortunate to see three adults swimming in a beaver pond at the headwaters of the Vermilion River. After destroying several broods of wild ducklings they passed on down stream. A pair of beaver and two "kittens" were unmolested.

Mephitis hudsonica (Richardson). STRIPED SKUNK.—Prevalent everywhere about the forest clearings and semi-open places.

Taxidea taxus taxus (Schreber). BADGER.—Occasionally observed in the open areas of the south-west corner of the Park.

RODENTIA

Marmota monax canadensis (Erxleben). WOODCHUCK.—Common everywhere except in the heavy timber.

Citellus richardsonii (Sabine). RICHARDSON GROUND SQUIRREL.

Citellus tridecemlineatus tridecemlineatus (Mitchill). THIRTEEN-STRIPED GROUND SQUIRREL.—

Citellus franklinii (Sabine). FRANKLIN GROUND

SQUIRREL.—These interesting little mammals are quite abundant in localities suitable to their needs.

Eutamias minimus borealis (Allen). NORTHERN CHIPMUNK.—There are few places which the chipmunk does not frequent. Colour variations are very noticeable in different environments.

Sciurus hudsonicus hudsonicus (Erxleben). NORTHERN RED SQUIRREL.—Red Squirrels are exceptionally abundant in all coniferous growth. There are no Grey Squirrels in the Riding Mountain.

Glaucomys sabrinus (Shaw). FLYING SQUIRREL.—Flying Squirrels are reported as being more or less common on the eastern slope of the Riding Mountain. I have made only one observation and as the specimen was not captured it was not possible to obtain positive identification of species. It would appear, however, that the squirrel observed was either *Glaucomys sabrinus sabrinus* (Shaw) or *Glaucomys sabrinus canescens* (Howell).

Thomomys talpoides. WESTERN POCKET GOPHER.—For want of comparison, determination of subspecies was unfortunately impossible. A number of specimens were captured. They belonged to the talpoides groups and, I believe, are either *T. talpoides talpoides* (Richardson) or *T. tapoides rufescens* (Wied).

Castor canadensis canadensis (Kuhl). CANADIAN BEAVER.—Several well established colonies exist at the headwaters of the Vermilion River and Spruce Creek. The beaver population of the Riding Mountain will not exceed 70 individuals; there is ample evidence however to prove that in the past many beaver populated the area. I have done a great deal of observational work, and in consequence have been fortunate to learn much of the life history of this most interesting of mammals.

Onychomys leucogaster leucogaster (Wied). MAXIMILIAN GRASSHOPPER MOUSE.—Several of these rodents were captured about the open stretches along the southern boundary of the Park. Apparently they are not numerous.

Peromyscus maniculatus borealis (Wagner). BOREAL WHITE-FOOTED MOUSE.

Peromyscus maniculatus bairdii (Hoy and Kennicott). BAIRD WHITE-FOOTED MOUSE.—These mice are very plentiful in localities suitable to their needs. *Borealis* is found in the forested areas about the north escarpment of the Mountain, and *bairdii* about the semi-open terrain of the southern boundary. A great number have been caught in "Delusion" traps for examination and comparison.

Clethrionomys gapperi gapperi (Vigors). GAPPER RED-BACKED MOUSE.

Clethrionomys gapperi loringi (Bailey). LORING RED-BACKED MOUSE.—Many specimens have been trapped and identified. *Gapperi* is found about the forests of the northern escarpment, and *loringi* along the wooded creeks to the south.

Microtus minor (Merriam). LEAST MEADOW MOUSE.—The Least Meadow Mouse is fairly numerous in favoured locations.

Ondatra zibethicus alba (Sabine). HUDSON BAY MUSKRAT.—Muskrats are comparatively scarce in the Riding Mountain owing to few localities being sufficient for their requirements. A few exist in the marshy portions of several small lakes about the height of land. Odd pairs are found in beaver ponds.

Zapus hudsonius. JUMPING MOUSE.—Several specimens of the Jumping Mouse were captured on the southern border of the coniferous timbered area of the northern escarpment. For want of comparison and positive identification it may be said that, as all specimens bore the same characteristics, the Jumping Mouse of the Riding Mountain is either *Zapus hudsonius hudsonius* (Zimmermann) or *Zapus hudsonius campestris* Preble.

Mus musculus musculus Linnaeus. HOUSE MOUSE.—Found wherever buildings exist.

Rattus norvegicus (Erxleben). NORWAY RAT.—Common about occupied millsite buildings.

LAGOMORPHA

Lepus americanus americanus (Erxleben). VARYING HARE.—Nowhere plentiful during the past three years. The greatest number exist on the northern and eastern slopes about the deciduous areas.

ARCTIODACTYLA

Cervus canadensis manitobensis Millais. MANITOBA WAPITI.—A conservative estimate of the Wapiti of the Riding Mountain will not exceed 3,500 head, although extreme figures are often suggested. Generally speaking they range throughout the whole Park area, but are most plentiful about the Kennice and Audy plains. Both summer and winter ranges are the same. The herd is not fed during the winter months.

Alces americana americana (Clinton). COMMON MOOSE.—The Moose is nowhere plentiful and has depreciated considerably in numbers during the past years through excessive poaching. The majority are found in the heavy spruce and willow growths around the Thomson Cabin and the vicinity of the Vermilion River from the headwaters of this stream to the point where it leaves the northern boundary of the Park. A few range in the vicinity of the Little Ochre River and casual animals are encountered throughout the slope of the eastern escarpment.

Odocoileus virginianus borealis (Miller). NORTHERN WHITE-TAILED DEER.—Quite plentiful throughout the Park.

Odocoileus hemionus virgultus (Hallock). BRUSH DEER.—The Brush Deer is comparatively scarce. Frequenting the sparsely timbered farmlands in the vicinity of the Park during the winter months it has become decimated through illegal hunting. The majority of the species inhabit the Ochre River district, but are casually encountered about the marge of the whole Park area

The following mammals have become extinct within the Riding Mountain during the past two decades:

Procyon lotor, RACOON; *Martes americana*, MARTEN; *Lynx canadensis*, LYNX.

MOLLUSCA OF CHILCOTT LAKE, QUEBEC

By A. LA ROCQUE

CHIEF JUSTICE F. R. Latchford described in *The Canadian Field-Naturalist* for March, 1926, a new *Lymnæa* of the group of *Lymnæa palustris* from Chilcott Lake, Quebec. At the same time he gave a list of other molluscs found in that locality.

Last summer the writer had an opportunity of visiting Chilcott Lake and collecting the highly interesting mollusc described by Mr. Latchford. It was expected that the species would be scarce but a good set of living shells was obtained within an hour. The dead shells lined the shore in considerable numbers and the living molluscs were plentiful on the algæ-covered rocks in shallow water.

Other molluscs were collected, some of which were not mentioned by Mr. Latchford. The following is a list of the molluscs of Chilcott Lake up to date. Species marked FRL were mentioned by Mr. Latchford [1] and species marked AL were collected by the writer on August 2, 1931.

PELECYPODA

Elliptio complanatus (Dillwyn)	FRL	AL
Anodonta cataracta Say	FRL	AL
Lasmigona costata (Rafinesque)	FRL	
Alasmidonta undulata (Say)		AL
Musculium sp	FRL	
Sphærium simile (Say)	FRL	

GASTROPODA

Campeloma decisum (Say)	FRL	AL
Amnicola limosa porata (Say)	FRL	AL
Lymnæa stagnalis jugularis Say	FRL	AL
Lymnæa (Galba) laurentiana Latchford	FRL	AL
Pseudosuccinea columella (Say)		AL
Helisoma trivolvis (Say)	FRL	AL
Helisoma campanulatum (Say)	FRL	AL
Helisoma antrosum (Conrad)		AL
Physa sp	FRL	AL

This list brings the number of species of molluscs from Chilcott Lake to fifteen. It is possible, even probable, that further collecting will bring forth other species not recorded here.

Elliptio complanatus was recorded as *Unio complanatus* and *Lasmigona costata* as *Alasmidonta costata* by Mr. Latchford. These have been changed to agree with Ortmann's Monograph.[2] *Alasmidonta undulata* is an addition to the list. Five valves of this species were obtained. The posterior slope shows no corrugation. The shells from Chilcott Lake were compared with some from Bernard Lake, identified by Dr. F. C. Baker of the University of Illinois and agree very well with them.

Amnicola limosa porata (Say): Mr. Latchford records this as "*Amnicola*, probably *porata*". My specimens agree with the description of *A. limosa porata* and therefore are here referred to that variety.

Some specimens of *Campeloma decisum* (Say) which have been long on the beach show peculiar staining. The ground colour is white with mottlings of pink, orange, red and blue. Some specimens have mottlings of only one colour while others show both blue and pink tints. This peculiar staining is not confined to *C. decisum* but also occurs on specimens of *Lymnæa stagnalis jugularis* from this locality. It has also been observed in specimens of both the above species from other localities.

My specimens of *Lymnæa stagnalis* from this locality belong to the variety *jugularis* (long known as *appressa*) and it is probable that Mr. Latchford's specimens also belong here.

Pseudosuccinea columella and *Helisoma antrosum*[3] are additions to Mr. Latchford's list. Nine specimens of the former and fifteen of the latter were obtained in 1931.

[1] Latchford, F. R. "A New Lymnæa" *Can. Field-Naturalist*, 40: 47, March 1926.

[2] Ortmann, Arnold E. Monograph on the Naiades of Pennsylvania, Carnegie Museum Memoirs, vol. 8, No. 1, 1919.

[3] It is a pity to see a well-established name like *Planorbis* relegated to synonymy but it seems that this old name must give way to *Helisoma*. See Baker, F. C., "Fresh-Water Mollusca of Wisconsin", Wis. Geol. & Nat. Hist. Surv. Bull. 70, pp. 310-311.

Of the *Phsya* sp. Mr. Latchford says "like the so-called *P. lordi* of Meach and adjacent lakes but smaller". If the Chilcott Lake *Physa* is identical with that of Meach Lake, it should be known as *Physella latchfordi* Baker.[4]

[4] Baker, F. C., *op. cit.*, p. 423.

AN ADDITIONAL BRACHYURAN CRAB FROM NORTHERN BRITISH COLUMBIA

By DONALD C. G. MacKAY
Pacific Biological Station, Nanaimo, B.C.

IN THE November number of *The Canadian Field-Naturalist* (1931), the writer enumerated the Brachyuran crabs from northern British Columbia which he had encountered during the course of marine research work for the Biological Board of Canada in 1930. The following summer an additional species was observed which it is considered advisable to add to the foregoing list.

Pinnixa tubicola Holmes, the species in question, belongs to the family *Pinnotheridæ*, a family consisting of very small crabs the females of which are commensal in bivalve molluscs, holothurians, annelids and other marine animals. The males are generally smaller in size than the females and are usually free swimming. Due to their small size and unusual habitat the crabs of this family are frequently overlooked.

Six specimens of *Pinnixa tubicola* were secured about midway between Prince Rupert and Metlakatla, living in the leathery tubes of annelid worms between high and low water marks. Five of the six specimens were females, three of which were bearing eggs when taken early in June. One of the females measured 4.5 mm. in length and 11.0 mm. in width. The male measured 3.7 mm. in length and 8.0 mm. in width.

The occurrence of this species near Prince Rupert is of especial interest since it does not appear to have been previously reported north of Puget Sound. The range usually given for the species is from Puget Sound to San Diego, California.

CONTRIBUTIONS TO THE KNOWLEDGE OF EXTREME NORTH-EASTERN LABRADOR

By BERNHARD HANTZSCH
TRANSLATED BY M. B. A. ANDERSON

"Beiträge zur Kenntnis des nordöstlichten Labradors," von Bernhard Hantzsch, *Mitteilungen des Vereins für Erdkunde zu Dresden*, Dresden, Volume 8, 1909, pp. 158-229. Volume 9, 1909, pp. 245-320.

(Translated from the original German text in the Library of Congress, Washington, D.C., by M. B. A. Anderson, M.A., Ottawa, 1928.)

Original pagination given in the text.

(*Concluded from Page 145*)

Through church and school instruction the Killinek missions began to bring to the members of the community a mass of more or less useful knowledge. I will only say concerning these methods of instruction that, for example, as a beginning of the reading they demanded the memorizing of the German alphabet. None of the Labrador missionaries with whom I spoke had heard of the so-called phonetic method. From the south of Ungava Bay in this direction some natives are already acquainted with the deciphering of those simple hieroglyphics which, introduced by the white people, are used by the British and Foreign Bible Societies in London for the publication of the four Gospels with the Acts of the Apostles. This little book is said to have spread to the Christian inhabitants of Western Labrador, to certain lands near Hudson Bay and rather far into Baffin Island. The spelling consists of twelve or thirteen simple signs, which according to their stroke unite the eleven consonants used with the four vowels which are to be heard most clearly. Written small, the signs indicate the consonants alone; points and rings placed above them serve for the changing of the vowels. In Killinek an effort is being made to change the method of writing used on the whole north of Labrador into Latin letters. This is, to be sure, far more difficult but is necessary to preserve uniformity in all the Moravian mission stations. Many, especially the older people, do not succeed in learning to read; clever young people are said to have acquired a good grasp of it in one winter. In 1906 a beginning had not yet been made with instruc-

tion in writing. Also only a few people at the older Christian stations are capable of composing a really correct letter. One of the men best informed about the Eskimo language, the president of the missions, Bishop Martin, in Nain, told me that letters were often brought to him which he was able [P. 305] to decipher, but often this was not possible. The sounds as spoken by the Eskimos do not sound as our letters express them. Therefore the people, who were properly taught, from lack of practice quickly forget that which they knew before. Therefore too much credence is not to be given to the statement when you hear that the Christian Eskimos of Labrador can read and write. Perhaps it is useful for the purposes of the mission and for the outside world, when the natives are able to decipher the Bible, church songs and other pious writings, yet on the other hand you may wonder, how much time and strength were spent on the art which brings in no bread, and how time and strength are withdrawn from necessary practical occupations. The singing of spiritual songs is cultivated zealously according to the custom of the brotherhood. Many people, especially women, have a high, strong and pure voice, in which almost always real harmony is lacking. The musical equipment of the Eskimos is not inconsiderable; at the Christian stations all possible instruments are played, especially violin, harmonium, organ, trombone and accordion, sometimes quite well. The use of gramophones has become a sort of mania there, and devours considerable sums. The Killinek people in my time were still far behind in such matters. The population has little adaptitude for arithmetic. However the small results lie in the difficutly of the methods of instruction. The Killinek people are contented often with singular, dual and plural. In the necessary exact transactions in my time they used the Eskimo way of counting on the fingers of one hand and two hands, the toes of one foot and of two feet, beyond that perhaps also the fingers and toes of a second man. Representations of the larger numbers do not seem to be very clear. The Arabic numerals with German names changed slightly are introduced by the missionaries, and it sounds very queer, when after an address in the Eskimo language, the missionary gives for example,, as the hymn to sing "Nummer sieben-und zwanzig". [P. 306] The rest of the mission instruction in general refers to the Bible and dogmatic instruction, occasionally to geography and natural history. They try to produce a correct understanding by showing pictures but it must be extraordinarily difficult to awaken accurate mental images in any measure, even approximately, because in the Eskimo language the words for an endless number of strange ideas are naturally entirely lacking. There are people at the Christian stations, who possess a slight knowledge of English, some also, especially girls employed in the mission houses, the German language. As yet in 1906 no one at Killinek had thought of such things. In respect to the industrial arts the Eskimos do not seem to have developed very far, since they do not stand in close relationship with the white people. That they naturally possess much skill, their primitive ability in the construction of skin boats, sleds, snow houses, etc., shows. These things they made while entirely independent of other peoples. They lack entirely metal implements for the finer kinds of work, for with working tools of stone or bone you can accomplish little. In spite of all this, the presence of artistic ability can be recognized clearly from certain old harpoon tips and other things cut from walrus tusks. Also the certainty with which entirely untrained people are able to make sketch maps and other simple drawings has repeatedly aroused admiration among travellers, though the comprehension of pictures is far less developed in the Labrador inhabitants than in the Greenlanders, who are skilled in art. There can scarcely be talk of a native art industry in Labrador. There is no trace of it to be seen in Killinek at all. The men are gradually learning from the whites the most needed trades, the girls and women knitting and sewing. But at the Christian stations I saw scarcely any evidence of work which would have passed the most ordinary average accomplishments. They would rather buy than exert themselves in manufacturing articles themselves, and the trading organizations [P. 307] encourage this dependence.

There is little money in circulation. They sell at the station, generally letting the price received be credited to them, and on suitable occasions buy wished-for articles of the same value. If they have used up all their money and have earned nothing more, then they receive a certain advance, and as a rule soon pay it back. If a sum of money is ever gained by the mission station through death or other misfortune, then this is written down on the account for support of the poor or some other kind of charity. This would be much harder on a private undertaking, purely a business concern not supported in other ways. In general the Eskimos have, through the mission, quite a lot of advantages and alleviations, which do not make it hard for them to be "pious". With some wisdom, subordination, and industry they can lead quite a comfortable life.

The native conditions in so far as they have kept them unchanged interest me more than the progress in the education of the Eskimos. The speech of the Killinek population in sound and vocabulary deviates a little from the true northeast Labrador dialect and approaches the one used more to the westward. The Eskimo language is extraordinarily difficult for us to master. Only superficial travellers who think they have already mastered the language with a few words and suffixes can deny this. There are doubtless few outsiders who really know Eskimo. Outstanding authorities on this district, with whom I spoke, such as the superintendents Bourquin and Martin, Professor Franz Boas, Captain James S. Mutch, etc., declared this to be almost impossible. The missionaries, Waldmann and Perrett, who are spending their second decade in Labrador often have to question the people several times before they understand the sense of the words. Also it sounded quite different when a missionary or a native spoke. The speech of the latter is not seldom indistinct to our ears, so that repeatedly I had to take pains to repeat after them some words or write them down, because I was not capable of grasping the sounds. This caused laughter many times on the part of the people. The speech organs are [P. 308] used differently from ours and as a consequence develop differently. That the language of the Eskimos which occurs in many dialects is related etymologically to the Ural-Asiatic languages is generally averred. Suffixes are attached to the stem-root, but placing of prefixes before the word is not known. Besides this the Eskimo has the principle of epenthesis in common with the Indian languages.

The sentence structure corresponds throughout to a mere word formation. The completeness of the language, its extraordinarily delicate and varied flexibility, which makes the study not only so difficult, but also so interesting, the slight variation in the different dialects spread through the whole of Arctic America, point to the great age of the Eskimo race, which has outlived its time and is now gradually dying. The majority of the people, with whom I was better acquainted, had a good command of their language. This might have its reason in their vivacious temperament and the resulting varied application of their language. Our natives are much more talkative than, for example, the North Europeans with whom I came into contact. When I sat with them in the evenings they chattered almost uninterruptedly. If I asked some people, especially old women, to tell me stories, then their speech was easy and almost entirely free of hesitation and slips of the tongue. In addition the voice is soft and flexible. In an animated tale imitation of the different tones of the voice of several persons is employed with clever modulation, the whole speech accompanied not rarely by lively mimicry and gestures; at times the whole occurrence related is pictured in a most theatrical fashion, so that you can follow even with a slight knowledge of the language. The minuteness of the manner of telling an Eskimo tale which has often been stressed is noteworthy. An Eskimo woman talked rapidly and smoothly for five minutes, without my understanding anything. If I interrupted and asked my interpreter concerning the content of the many words, she would say the story had not yet begun; the part just told had been quite insignificant preliminary remarks. For example in order to picture the occurrence known to all, how a family starts out on a journey, [P. 309] a clever story teller may hold the attention of his audience closely for perhaps a quarter of an hour. These listen with close attention, interrupt the speaker often by exclamations, which occasionally change into animated laughter and chattering of the whole company. Much of that, which I heard, I have already used in the accounts which precede this. Lack of space forbids me, repeating the many short and partly incomplete accounts by our Eskimos of their life in former times, their communication with one another, with the whites and the Indians. I will give in a few words only two examples of their tales, which have the most coherence, in order to give a presentation of the folk-lore which unites in part all Eskimo bands. There does not seem to exist a very literal tradition in the verbose impersonation of these people. Every story teller adorns the matter more or less according to his judgment, occasionally apparent gaps are to be found in the course of the treatment of the story, which are filled out at the most with the supposition: it perhaps may have been so and so. An old woman from the south of Ungava Bay told me the following story.

THE BAD STEP-MOTHER

An old *Angakok* (Sorcerer) lived with his two wives in a bay which had an abundance of seals. The older wife had a grown son, the younger a daughter just the same age. One night a *Torngak* (spirit) appeared to the old man and spoke to him: "In the morning on the hunt I will get you!" Early the next day the *Angakok* arose, put on his fur clothing, and softly told his younger wife, who had awakened because she was lying near him, that which he had experienced in the night. She laughed, acted as if she did not understand his words right and lay down to sleep. In reality,

however, it would suit her if the old man did not come back. Since she herself understood sorcery she had already learned that he must die soon, and therefore she was looking around for another husband. With low words the father woke up his son and ordered him to go with him on the seal hunt. Soon they were ready, stepped out into the bright June morning, shoved their kayaks from the shore into one of the open channels, which extended between the cakes of ice and paddled slowly away. They had to get out many times and transport their gear across the ice, until they caught sight of seals in the distance. They approached the creatures carefully from different sides. Before they could throw their harpoons, a mighty iceberg burst, toppled over with [P. 310] a crash like thunder and buried the old man. The son was almost frightened to death, but after a time cautiously rowed nearer. In spite of careful search he could find not the slightest trace of the boat or of the unfortunate man; the *torngak* had taken the old *Angakok*. At last the son went home and told what had happened. There was no special grief. Scarcely a week later the older wife died, the mother of the young man. They were not especially surprised, since it frequently happens with the Innuit, that someone becomes tired without apparent reason, and dies after a very short time. The people in the vicinity, however, gave the younger wife credit for nothing good, since they knew that she understood how to sing the conjuring songs better than the others and often wandered about at night, whenever the Northern Lights shone bright as moonlight. And, strange to say, misfortune overtook her son also. He became snow-blind, in spite of the fact that he had worn wooden goggles. The pain was scarcely to be endured. Then the step-mother brought a salve, rubbed his burning eyes with it, and sang remarkable songs. The pain subsided, but his sight did not return; the young man had become blind through the craftiness of the old woman. The next morning the unhappy man sat alone in the tent, when suddenly he heard a deep growl before the entrance, and knew that a polar bear was outside. Silently he grasped his harpoon, which lay near him, tested the weight in his hand, and hurled it with all his might at the place where the creature must be standing. He heard an angry roar, then a few hasty steps, and now it was quiet. He had killed the bear. But he did not dare to go in front of the tent, since he had no other weapon. After some time the sister came, brought the harpoon and said it had been lying outside. She also gave the poor young man a piece of meat. He ate of it and asked if this were not bear meat. She answered, however, at the command of her mother, "No, we have hung a dog and that is the meat from it." The blind boy tasted the meat again, and could not believe her. He was deeply troubled as never before in his life, stopped eating, pulled his hood over his face and groped his way outside. A late June day, gleaming like gold, lay across the quiet landscape, still covered with much ice and snow, but the sun blinded him no longer. He was quite blind. Slowly he walked up the hill-side, the path which he had trod so many times with seeing eyes and laughing countenance, turned into a valley protected from the wind, sat down on a large stone, and began to weep bitterly. Then he suddenly heard a harmonious voice near him, that said to him: "I am the *torngak* of your father, and will help you. Go to the pond at the end of the valley. There you will learn in what way!" A light breeze touched the forehead of the blind man and dried his tears. Filled with hope he arose and went farther along the path, groping his way, until he felt the water of the pond at his feet. He listened and all at once heard another strange voice, which came from the large bird *tullik* (loon), which was swimming on the water. [P. 311] "Kneel down," said the bird, "and wash your eyes!" The blind man did this at once, and soon noted how the power of sight returned to him. He bathed his eyes until he could see well again, even better than before. He could see every little stone at the bottom of the lake. But the *tullik*, in other respects a very shy bird, had swum close up to him in the meantime, walked up on the shore, and said: "Now carry me to your step-mother, but don't tell her that you can see again!" The young man seized the bird by the wings obediently and walked down the valley. Near the tent he saw the woman, as she was spreading out the bear skin to dry it. Then, he who had been blind, played a part, carefully felt his way forward, until he stood near his step-mother, set the bird on the ground near him, and felt of the skin. "Isn't that my bear?" he asked. "No, that is the skin of the dog which we killed" the bad woman answered. In the same moment the bird *tullik* began to grow in a terrible way, beat with its wings and croaking angrily ran at the liar. Seized with the terror of death she plunged away down the slope to the seashore. But when she reached the water the terrible bird had nearly overtaken her. She recognized her end had come, uttered a wild shriek, and threw herself into the sea. Here she was changed into a seal. But the bird sprang after her, both disappeared under the waves and have never

been seen again. The young man, rescued in so fortunate a manner, went to his tent, called in his sister, who had deceived him only from fear of her mother, but was otherwise kind and friendly, and lived happily with her from that time on.

THE THREE SISTERS

Three young sisters wished to marry, but their father said, "Wait awhile!" Then the eldest said to the others: "Let us go away from here secretly and seek husbands for ourselves!" Soon all three started off, left the shore of the sea, and wandered into the interior of the country. Suddenly they came into a strange valley. Many stones were scattered about and stood up high, looking like men. On the slopes, however, there were countless caves, which were sell suited for dwellings. Then the eldest of the girls stopped and said: "Go on farther, sisters! I will live in this valley and marry a stone man." They bade her good-bye, and then the girl carried moss and grass into one of the caves, made a bed, dragged in one of the strange-looking stone men and lay down beside him. Scarcely had her limbs touched the queer form, when she, too, began to turn to stone. She tried in vain to spring up. It was too late. She, too, turned into just such a stone as the many that lay outside. Meanwhile the two other sisters went on farther. Then the second one caught sight of the upper wing bone of a snowy owl, picked it up from the ground and said "I will marry this!" The third sister wandered on alone, until she came to the sea. Here she found a piece of whale's bone, which she chose for a husband. When the second sister [P. 312] touched the bone of the owl, it changed suddenly into a large snowy owl. The bird seized the girl, and carried it away to its rocky nest up in the mountains. At night he stayed near her, by day he flew away. In the evening he brought a great many little birds for food. So she lived on the cliff, and soon bitterly repented having left her relatives. She wept and begged the owl man to take her down again, but he shrieked so loud, she was frightened and was silent. At last she found a way to help herself. She collected all the sinews of the animals which he carried home for food, and braided a rope from them, which she concealed behind the large rock nest, until it became long enough to reach down. Day after day she worked, until her fingers bled, and at last the flesh dropped from the bones entirely. But, finally, when the owl had brought a young caribou, the rope was long enough, and the girl tied it fast to a rocky crag. At the same moment she heard human voices and caught sight of her relatives, who had gone out to hunt for the three sisters. They had found nothing of the eldest, and at last they had come to this place. The girl quickly climbed down the rocks. They were happily reunited and pitched their tent in the valley. But as the sun sinks, something soars noiselessly nearby in the air. It is the snowy owl that has returned, and is looking for his wife. Then one of the relatives shoots an arrow at the bird, and strikes it in the middle of the body. He falls to the ground as a mere upper arm bone, and the maiden is released. The next day they journey farther to hunt for the third sister. When this one had married the whale's bone, a real man had come from it. They built a tent and lived together on the seashore. The husband was afraid she might run away some day and tied her fast to himself whenever he was at home. One morning the girl sees the skin boat of her relatives through the tent door while her husband is still asleep. When she pulls at the thongs excitedly with which he has tied her to himself, he awakes and asks what is approaching on the water. She says: "Only a wave," whereupon he goes to sleep again. Then carefully she loosens the sinews and ties him to the poles of the tent carefully, runs away and arrives at the beach, just when her relatives are alighting from the boat. She is recognized with great joy, is taken into the boat quickly, and they push away from the land hastily. Meanwhile the man awakes, knows that he was betrayed, but has much trouble in loosening the strings. At last he is free and runs to the sea, changes into a whale here and hastens after the boat. He soon overtakes it, swims around it angrily and thrashes the water so violently, that the people in the boat expect every moment to see the weak craft upset. Then the girl, who keeps herself hidden on the bottom of the boat, throws her outer garments into the sea. The whale man believes she herself has fallen in and swims about sadly hunting for her, so that the water quickly becomes smooth again. But when he does not find her, he thinks she was drowned, turns back, climbs out on the land and becomes a whale's bone again. The two girls, however, from that time on obeyed their parents. [P. 313]

In most of the sagas such transformations play a large rôle. I heard fantastic stories related of whales, walrus, seals, bears, dogs, foxes and many birds. A number of accounts agree quite closely with such tales from the abundant collection which Franz Boas has published according to the communications of James S. Mutch, (Bulletin of the American Museum of Natural History, Vol. XV, 1907: Eskimo of Baffin Land and Hudson Bay), and recur again also in Christian Labrador and in Greenland. The origin of the white people,

according to another account, also of the Indians, is told in the same way, as everywhere else with the Eskimos, that a girl against her wishes bore children to a dog, who outwardly resembled the father, but mentally resembled the mother. After these young dogs had torn to pieces the wicked human father of the girl, the daughter would no longer live wih them. She made a boat ready, placed the white dogs in it, and commanded the wind to carry them away. "Go away and become white people!" she cried to the departing ones. "So the *kablunat* descend from the white dogs, who now and then come to the Innuit in wooden ships from the other side of the sea". In the telling of this saga, it was of interest to me that the woman had fashioned the ship from birch bark. To my question, whether this was the custom in the well-wooded south of Ungava Bay, from which my informant came, she answered she had never heard of it, but it had been so in the story. Since the use of birch bark boats is said to continue among the Eskimos in the interior of Alaska, it may be assumed that the wide-spread saga has had its origin either there or has arisen at a time, when the Eskimos generally made use of such craft, and had not yet constructed skin boats.

Not much different from legendary tales are the confused religious ideas of our heathen people. Any sort of dogma of faith does not exist; a sum total of superstitious views forms the whole of the slight religion. At least it is impossible to learn from the people anything uniform. The conception of real gods [P. 314] apparently does not exist. Religious worship is essentially ancestor worship. Also in the countless traditions of this race the natives agree, with slight variations, with other Eskimo bands. Thus they know the saga of the earth falling from heaven; of the genesis of human beings as little children; of the daughter, who had to marry the fulmar, was then thrown by her father into the sea in flight and, when climbing into a boat, had her fingers and hands cut off by the hard-hearted man, from which seals, walrus and whales have originated. Faith in continued life after death is wide-spread even if the opinions about this differ and, after the introduction of the Christian conception of religion, vary still more. The Eskimos have scarcely ever had true priests. The *Angakut* were the carriers and the prophets of the superstitious traditions, in whom great faith was often placed. The eldest of the five brothers from the southeast of Ungava Bay, of whom I already have spoken repeatedly, called by his Christian name Zacharias, reported to me many things of his dead father, who had been a famous *Angakok*. This man, it is alleged, had often communicated with *torngat* or spirits, among whom originally were represented perhaps only the souls of the departed ones. According to the belief of these people, the *torngat* appear from time to time, prophesy in many cases death and misfortune, but often act in a friendly manner toward human beings, foretell the future for them, advise and protect them. The *torngat* are said to have announced beforehand to the father of Zacharias that the time will soon come when the people would turn away from them. It is true that no supernatural inspiration lay in this information from the old man. At that time the tireless Peck, Eskimo missionary to the Eskimos, who later went to Blacklead Island in Cumberland Sound, was carrying on his mission work in the north-western parts of Labrador. From there knowledge of the gospel spread among the Eskimos even as far eastward as Ungava Bay. The inhabitants of the region of George River, among whom were these brothers, were so impressed by it, who knows on what grounds, that they decided to forsake the old heathen belief. They asked the representative of the Hudson Bay Company for Christian baptism [P. 315] which this man administered without being authorized. The old *angakok*, just mentioned, did not keep the members of his family away, immediately ordering them to pray to Jesus. He himself did not do this. Following the preceding announcement the old man was drowned some time afterwards, when a whirlwind turned his kayak over. His son, Nicodemus, who was with him could not rescue him. This *angakok* was able to carry out strange sorceries, in which his family still believed firmly in spite of its Christian veneer, as I was told. For example, it is alleged he ate his own fingers and his arms up to the elbow and spit the bones out in a little pile. By repeating magic formulæ the arm grew slowly, in the beginning tender and small as in the case of a child. This, it was asserted, had been seen many times. Many male and female *angakut* are said to foretell the future, or to be able to describe incidents of the past. Thus a deceased aunt of Julius Lane, in Killinek, who lived in Aulatsivik, was said to be able to tell three to four days afterwards exactly what people who came to her had done, although being weak and old she remained in her tent the whole time. Likewise J. Lane claimed to have met a woman in Fullerton (North-West Hudson Bay), who days later gave him exact information concerning his doings. Often the *angakut*, it is true, use their powers for deeds of vengeance. Therefore it is necessary to be on guard against them. If, for example, the tale runs, a sorceress menstruates,

through magic formula she is able to suppress the blood. This then changes to a bird, which looks like a sea-gull, but is coloured blood-red. It can be sent forth as an instrument of death, and in the winter of 1904-1905 is said to have appeared in Killinek. It is alleged some people had seen the bird flying, and they even secretly pointed out the house from which it had come. Soon afterwards a relative of my companion, Paksau, died, a healthy man in the prime of life, who with two brothers dwelt in a fine little sod house. A short time afterwards one of the surviving brothers visited the Lane family, sprang suddenly from his chair and said: "My dead brother has given me a blow on the head; I am to come too!" From that day on he became ill and died just a month later, after he [P. 316] maintained, as did other persons, he had seen the soul of the first brother repeatedly hurrying about in the air without peace. One day the deceased man had said to the missionary, Mr. Peck: "My brother has taken my soul from me." To his question: "Where is it, then?" he answered: "With Jesus." After the death of the second brother the third became ill too. Medicines would not take effect. Then an old woman tried to help by singing magic sounds for hours, but he had to die also. The use of amulets as a means of protection against harmful influence of spirits does not seem to be employed any longer by the Killinek Eskimos at the present time; on the other hand the missionary, Mr. Perrett, saw a fish and a dog whip sewed on the inside of pieces of clothing in the case of two inhabitants of Aulatsivik. Naturally the old belief is not lost so quickly, if they guard against giving strangers information concerning it.

It is just as difficult to hear the heathen songs of the population, but upon repeated requests they gave me some exhibitions of them. Their tunes are reminiscent throughout of the monotonous songs of other primitive people. The melody consists of a few tones among which a main tone is predominant. Characteristic of the execution is a strong tremolo of the voice. An especially musical person sings the real content alone, whereupon the others present join in the chorus, often only with the syllables, *aja, adjaja, aaja.* Usually laughter and chatter follow the end of the song, out of which you can imagine a jesting, derisive, and at times perhaps a not quite moral substance. The real magic charms and songs on the other hand are said to be produced in great seriousness, in a deep voice and only half aloud. The Killinek people do not possess a piece of wood on a resonant object. Still less do the people like to show their heathen dance, which is entirely forbidden by the missionaries. Notwithstanding this, they amused themselves in my time with this dancing whole nights through. When I wished to see the dance for the first time, two half-grown girls were fetched in and I [P. 317] was surprised to see with what enthusiasm and evident skill these girls conducted the forbidden play according to their own interpretation. The manner of the Eskimo dance throws a light on the original purpose of the dance in general and I understand very well how the austere Moravians forbid such performances with all earnestness; no one is baptized who does not promise to refrain from it. Such a primitive dance is to be compared with the mating of the birds and other creatures. The sexes seek, in this case reciprocally, to make themselves noticeable and desirable through provoking motions in a sensual manner; it is nothing more than a voluptuous play of the sexes, which in winter, as they say, when the Eskimos dance in their warm snow houses many times almost without clothes, is also followed by the reality. Two persons, usually of different sex, seldom more than two pairs, place themselves opposite each other and in the beginning scarcely raise their feet from the place where they stand. They move the body, however, in lively jerks and shaking motions, especially the abdomen. This reminds you a little of the Arabian abdomen dancers. During the whole performance the dancers utter a quick cough incessantly, that sounds nasal and must be very strained. Older women are usually hoarser. According to the statement of one of them this is the result of many dances. As the play becomes gradually more fiery, the pairs hop about with wild motions of the body and, jumping, change places many times. The arms are usually bent at the elbows. The ones sitting about reiterate their monotonous songs, clap their hands and encourage the dancers by merry speech. Great exhaustion follows the wild excitement at last. Several times I surprised girls and younger women as they conducted a sort of round-dance, but they could not be induced to continue this in my presence. I could not learn whether this concerned an old custom or a newly acquired child's play.

On October 6th the *Harmony*, which meanwhile had visited the other Moravian Mission stations of the Labrador coast and had gone to St. Johns, Newfoundland, turned back to Killinek unhindered in spite of the late time of year. On October 11th I said good-bye to my quiet mountains and valleys, which were now gradually taking on the look of winter; and took my departure also from the friendly people who had supported me

in my work and in all else had tried to make my stay in their neighbourhood as pleasant as possible. About three o'clock in the afternoon the anchors were lifted, and in the dark fog we steamed toward Gray Strait. The sea was ice-free everywhere, only here and there scattered icebergs were to be seen. The whole north coast of the land slopes abruptly, but in many places islands are to be found stretched out in front of the coast, and rather small inlets, several of which are said to be suitable for harbours, as Captain Blandford, mentioned earlier, ascertained. The currents in Gray Strait were overcome by us with some exertion. We rejoiced in the sight of Button Islands, which lay before us in rare evening clearness with their dusky mountains. Since this group, on account of the dangerous surrounding sea, was perhaps never visited by a white man, their position is only approximately fixed cartographically. Their highest elevations may attain a height of 200-250 meters. Also strong currents are said to prevail at times between the different islands, which make a crossing almost impossible, as long as the sea is not entirely free of ice. But the islands are said to have an abundance of animal life and wood, for which reason they were visited regularly by the Eskimos. At present the natives still go occasionally, especially at the end of July and beginning of August when the weather is most favourable and there is the least wind, to those places, and even then only in the company of an exprienced local guide. Toward evening we sighted Cape Chidley, not quite determined geographically, which rises up high and steep. Somewhat south of this there is a tolerable harbour for larger ships, and here are situated primitive Eskimo dwelling sites. At low tide you can go on foot from Chidley Island to the land situated toward the south, and from there by the nearest way to Port Burwell in favourable weather and without very much baggage. This may be indeed a very strenuous trip, but is easier to carry out in winter with sleds. [P. 319] The coasts between Cape Chidley and the eastern entrance of MacLelan Strait are said to slope sheer into the sea everywhere and to be dangerous to navigate in an east wind. Some harbours are to be found, which afford sheltered anchorage for ships. We ourselves navigated on that evening not along the coast, but a little way out into the Atlantic in order to escape some reefs. In the last light of evening I recognized the island New Plauen. Then the night sank down and for my soul to a certain extent also the curtain for the interesting dramas which I had witnessed and in which I even played a part, up there in the extreme north-east of Labrador.

On the next afternoon we anchored in the harbour at Rama, that station which has such a splendid location, but which is looked upon somewhat unkindly in respect to sources of industry. Because of the latter reason this was given up in 1908. A few days later we went farther down the Labrador coast. On October 15th at noon we stopped at Hebron, after Robert Peary had left this harbour six hours before. His expedition ship, *Roosevelt*, had been overtaken on its return voyage from the north at Resolution Island in a fearful storm and had been badly damaged. Besides there was a lack of coal and provisions, of which they could get little in Hebron. We would have been in a position to help with this, but we were not expected back so soon, and therefore the *Roosevelt* had moved slowly southward along the Labrador coast with steady use of the pumps. We stopped at all stations of the Moravians three to nine days, from Hebron down at Okak, Nain, Hopedale and Maggovik. I therefore had opportunity to learn to know land and people at least hastily, and from the missionaries also received many kinds of important information about the Eskimos of those regions, all of which was valuable for comparison with the Killinek conditions. My own observations caused me to regard those northerners as far more sympathetic people than the ones of the other stations further advanced in civilization. Perhaps my eyes and ears were prejudiced by previous judgment, but from the mouths of the missionaries I had to hear much criticism concerning the Christian Eskimos [P. 320] and the missionary, Mr. Perrett, who left Killinek with me after a year's residence and moved over to Nain, thought as I did, not without sadness concerning those people of nature up there. I will not describe the more southern portion of Labrador, on account of the theme of my work. It is very much more accessible and therefore far better known and described. On November 16th I arrived in St. Johns, the capital of Newfoundland, to leave the *Harmony* with many expressions of gratitude to the crew, particularly Captain J. E. Jackson, who had been so kind to me always. I made connections at once with the steamer *Siberian* of the Allan Line to Glasgow, where I landed on November 26th in good health. On November 28th I was home again in Dresden and at the end of my journey.

NOTE TO MAP

The appended sketch map gives improvements in the drawings of the coast line from the north-east tip of Labrador. It does not claim to be

Nordost-Spitze von Labrador
Skizze nach den Karten der englischen Admiralität (bis 1906), der Map of the coasts of Hudson Strait und Ungava Bay by R. Bell and A. P. Low (1900), der Geological Map of the northeastern parts of the Dominion of Canada by A. P. Low (1905), u.a., sowie nach Eskimozeichnungen und eigenen Untersuchungen (1906) gezeichnet von Bernhard Hantzsch. 1908.
Button Islands
Labrador Pt.
Gray Strasse
Atlantischer Ozean
Ungava Bai
Gebirgsland N.O. Labrador
Sattusuak
Kap Chidley
Kikkertaluk
Amiaktuvik
Okkiaktuvik
Kangerdluajuk
Station Killinek
Kikkertauak
Port Burwell
Ujuka
C. Will. Smith
Uivvak (Nuvualuk)
Nuvualuk
Tessiujaktuk
Tessiulak
Schnee Bucht (Tessiujaksuk)
Mac Lean Stn. (Ikkerasak)
Nigutsit
Amitok
Immelgaksuk
Kikkertasoak
Neu Plauen
Tunnusuksoak
Kakkivialuk
Pitsiulak
Nuvualuk
Sorgnujak
Salasuk
Ujuk
Avajalik
Kakkividak
Omanak
Kikkertaluk
Ugjatalu
Tassiaktsit
Pekuktuk
Tessiujarsuk
Ulleuduit
Pikkiutit
Kikkertet
Mt. Banks 900m
Nutsitok
Kikkertasuak
Tuttusitsivik
Ukkerasik
Tassilik
Ukaliuk
Ikkerasak
Sivoralik
Tikkiraluk
Nangertsuajuk
Eclipse Hr.
Ayulattsivik
Tarrekok
Ikkerasak
Angmaitsch
Four Peaks 1600-2000 m
Kangerdluarsuk
Tikkerarsuk
Saglharutsit
Alexander St.
Kornaktorvik
Nasoriak
Napartolik
Amomajalik
Akkilorsaluk
Ikkiraluk
Ikkinerektok
Karlik
Ptsiulortsivik
Kamatok
Ujaratsujalik
Davison Rt.
Nennoktok (White Bear Kap)
White Handkerchief
Mt. Razorback
7000m
Big Rt.
S.E. Rt.
North Rt.
Passage Rt.
Nachvak
Nachvak Bay
Nakvarchtok
66° Long.
Long 63°
60° Lat.
65°
64°

cartographically correct, however, especially as in most localities it depends upon material reported by others. From the representation of numerous inlets on the east coast of Ungava Bay as reported by the Eskimos of those regions, it may be seen that this coast does not run in a direct line, but is deeply indented. MacLelan Strait, which has been drawn on no map heretofore, as far as I know, as well as the large island New Plauen which is different at high and low tide, may be approximately correct. The majority of the mountains represented are the most important of those known by Europeans with names, but perhaps not by any means the only important elevations in these mountainous lands.

Attention is called to the fact that the section dealing with mineralogy, which appears in Vol. 45: 222, Dec., 1931, is translated from a report by Dr. Johannes Uhlig, who investigated the mineral specimens collected by Hantzsch, and reported on them under the title "Untersuchung einiger gesteine aus dem nordostlichsten Labrador".

In bringing this translation to a conclusion, thanks are due to the following for their assistance and co-operation, which have done so much to facilitate the work:—F. J. ALCOCK, R. M. ANDERSON, D. JENNESS, D. LEECHMAN & M. O. MALTE —M.B.A.A.

THE BIRDS OF OTTAWA—ADDENDA TO FEBRUARY 28, 1930.

By HOYES LLOYD

(*Concluded from Page 127*)

45. *Sturnus vulgaris* (Linnaeus). STARLING. —It seems only a short time since the Starling reached Ottawa, and now it is a very common bird, usually migratory I think, for it is not generally distributed in winter, but occurs at that season in flocks in only a few localities, particularly near the city refuse dumps.

In summer it nests generally throughout the district, and although the earlier located nests were in high inaccessible places, the pressure of population has apparently driven the nesting birds to lower levels, particularly the nest cavities of the Flickers which are so common in telephone posts and elsewhere along the country roads near Ottawa. Miss A. Swain, of Westboro, told me of Starlings dispossessing Flickers of their nest cavity, in the spring of 1929, and showed me an egg that the evicted Flicker had laid on the ground near by.

Some nesting dates for Ottawa are as follows:—

1. H. Groh reported Starlings nesting in a huge elm near the end of the Wrightville car line, Hull, Quebec, in 1923.

2. 1925: G. R. White reported a pair nesting at Britannia, Ontario, prior to the next date.

3. May 17, 1925: I saw Starlings going to and from the dead top of a high tree. The birds were extraordinarily cautious, flying toward the nesting tree, but scarcely ever alighting while I sat quietly on the ground a hundred feet away. This was a few miles north of Hull, Quebec, near a spur of the Laurentians.

4. June, 1925: I have a brief note in my records that Starlings were nesting on K. Fellowes' property, west of Hull, Quebec.

5. May 26, 1926: Wilmot Lloyd and I saw an occupied nest in a hole about 25 feet from the ground in an elm at Britannia. The old birds were carrying food.

6. June 1, 1926: Found a Flicker and a Starling occupying adjoining Flicker houses on the property of the Ottawa Hunt and Golf Club.

7. May 28, 1927: Near Fairy Lake, Hull, saw a Starling carrying food to an elm with dead limbs at top. Very wary.

8. June 26, 1927: H. A. Lloyd collected a juvenile (full-grown) from a low nest, which I found in the sand dunes, Merivale Road, a few miles from the city. First definite breeding record.

9. April 27, 1928: C. E. Johnson—Pair building, Ottawa South in eaves of house.

10. May 17, 1928: C. E. Johnson, C. L. Patch, J. S. Lord—Nest and two eggs collected near farm, Mer Bleue. I was chauffeur to this party, and these were the first Starling eggs I had ever seen.

11. June 8, 1928: C. E. Johnson—Nest in tall elm, Ottawa South.

12. June 10, 1928: C. E. Johnson—Nest with young in hollow basswood, Rideau River.

13. June 20, 1928: W. Fletcher Kelly—I have a nest and four eggs collected by Mr. Kelly from a Flicker box at his place, Britannia, Ontario.

14. June, 1928: G. A. Miller—This year we had a pair nesting under the shingles of our house, 180 Belmont Avenue. They are not very desirable overhead tenants, although they destroyed an abundance of cutworms in feeding their family.

GENERAL NOTES:

1. August 30, 1924: Small straggling groups going to roost with the Blackbirds at Britannia.

2. 86 Starlings were recorded at the time of the 1924 Christmas Bird Census[5]—C. E. Jonhson, 85; R. E. De Lury 1. Also Dr. W. E. Hurlburt reported them in his radio bird lecture.

3. I have noted in my diary that 1924-25 was the first winter in which they were here in any number.

4. August 18, 1929: Flocks flying over woods nightly at Rockcliffe Park, in marshalled ranks that must have totalled thousands.

46. *Quiscalus quiscula æneus* (Ridgway). BRONZED GRACKLE.—On May 28 and June 10, 1925, C. E. Johnson saw a piebald example with white head and mottled body plumage at Lansdowne Park, Ottawa. Fledglings and eggs were noted on the excursion made by J. S. Lord, C. L. Patch, C. E. Johnson and me to the Mer Bleu, May 17, 1928.

47. *Hesperiphona vespertina vespertina* (W. Cooper). EVENING GROSBEAK.—E. G. White noted four on February 24, 1925. Mr. White also reports two in the garden on April 19, 1928. Other dates for early 1928 furnished by him are: February 8, 12 near Museum; February 10, 5; February 12, 6; February 13, 12; the latter in the garden. On March 20, 1925, a flock of 42 were feeding on Mountain Ash berries on the residential grounds of Harrison F. Lewis. This group included some adult males. The birds came about 8.00 a.m. and fed freely upon the berries, taking most of those remaining upon the tree. Apparently they ate only the seeds, with the pulp immediately about them, for quantities of the outer skins, with some pulp adhering, fell upon the surface of the snow. Later occurrences were noted from March 22 to March 26. R. E. De Lury has many records of their occurrence at the Experimental Farm.

48. *Pinicola enucleator leucura* (Muller). PINE GROSBEAK.—E. G. White reported eight seen in his garden on February 15, 1928. Harrison F. Lewis reports eight as being seen on April 1, 1928. The winter of 1929-30 found a number of them here and many records have come to hand, dating from the Christmas Census, 1929. They have been observed, in January, 1930, in the tree-tops from my home desk. R. E. De Lury has many records of their occurrence at the Experimental Farm.

49. *Carpodacus purpureus purpureus* (Gmelin). PURPLE FINCH.—There was a big flock at our feeding station during late February and March, 1929, and a number were banded. They were at other feeding stations in the city too, notably that of R. E. De Lury, where many were banded.

[5] *C.F.-N.*, 39: 17, Jan., 1925.

50. *Loxia leucoptera* (Gmelin). WHITE-WINGED CROSSBILL.—E. G. White tells me there were three in his garden on February 7, 1928. A flock was identified by Harrison F. Lewis, Robert Lockwood and Harlow Wright, near Aylmer, Quebec, on the Christmas Census, December 26, 1927.

51. *Acanthis hornemanni exilipes* (Coues). HOARY REDPOLL.—See comment under *Acanthis linaria* subspp.

52. *Acanthis linaria linaria* (Linnaeus). REDPOLL.

53. *Acanthis linaria holboelli* (Brehm). HOLBOELL'S REDPOLL.

54. *Acanthis linaria rostrata* (Coues). GREATER REDPOLL.—In the latter part of the winter of 1926, and during March and April many Redpolls came to R. E. De Lury's garden, 330 Fairmont Avenue, Ottawa. Between March 11th and the end of April he captured and banded about 700 of them, and kept very full data of measurements, etc., which it is hoped he will publish. He tells me that most of these birds were *Acanthis linaria linaria* but a considerable number would pass for *Acanthis linaria holboelli*, with many grading between. Nearly 200 were *A. l. rostrata*. About one per cent. of the number were *A. hornemanni exilipes*, and an equal number appeared to be intermediate between *A. l. linaria* and *A. hornemanni exilipes*. The measurements indicated every variation between *A. l. linaria* and *A. l. rostrata*. For example there were small Greater Redpolls which could be recognized as such by the short thorax and a characteristic call-note which was bell-like and could be described as contralto. As spring progressed small flocks came northward and at times the proportions of Greater Redpolls increased. A number of similar Greater Redpolls would be banded and then another group would turn up with slightly different characteristics. Dr. De Lury found as great differences between small and large Greater Redpolls as between *A. l. linaria* and *A. l. holboelli* and thinks there is little justification for *holboelli* except perhaps as a limiting case of *A. l. linaria*. There have been no returns from these bands in another season. No doubt heavy snowfalls in March, 1926, helped to bring the birds to the abundant supply of millet at Dr. De Lury's station.

55. *Spinus pinus* (Wilson). PINE SISKIN.—There was a flock at home during March, 1929, and a number were banded. Numbers also visited R. E. De Lury's place during the winter of 1928-29 and remained until spring.

56. *Zonotrichia leucophrys leucophrys* (J. R. Foster). WHITE-CROWNED SPARROW.—

The main spring flight seems to go through about the twentieth of May. Usually some are seen on the excursion of the Club which is held about this date to Fairy Lake, Hull, Quebec. On the trip to Mer Bleue, May 17, 1929, C. E. Johnson noted nine. R. E. De Lury bands some nearly every spring at his station. For three years in succession the last bird left on May 27th.

57. *Spizella pusilla pusilla* (Wilson). FIELD SPARROW.—As this is an uncommon bird in the district it is of interest to record that E. G. White found one at Carp on May 16, 1925.

58. *Melospiza melodia melodia* (Wilson). SONG SPARROW.—To previous accounts of the species in the Ottawa list must now be added the fact that it is an occasional winter resident; two were seen at Deschenes, Quebec, on December 28, 1924, by Harrison F. Lewis and Robert Lockwood who were engaged in taking the Christmas Bird Census. On the afternoon of January 6, 1925, C. E. Johnson and I found one at the Ottawa South refuse dump. The bird was on the southern slope of a fill where Bronson Avenue is being projected across the cat-tail marsh of Dow's Swamp. It seemed chipper and happy, and it was in fine plumage. The dump provided ample food, and even good shelter in the form of discarded Christmas trees. The bird's associates were House Sparrows and rats, and Crows and Starlings were also wintering at the same place.

Two were found by one party, C. E. Johnson, C. M. Sternberg and R. Sternberg, at Dow's Swamp on the Christmas Bird Census, December 26, 1927.

One was observed by R. Sternberg and Joseph Skillen on December 22, 1929, Christmas Bird Census.

59. *Melospiza lincolni lincolni* (Audubon). LINCOLN'S SPARROW.—E. G. White reports seeing two in the park near his residence on April 20, 1927. R. E. De Lury has banded several at his station.

60. *Melospiza georgiana* (Latham). SWAMP SPARROW.—Robert Lockwood has furnished me with the first definite breeding record of which I am aware. He found a nest containg four eggs of the species, and one of the Cowbird, in a hummock of marsh grass near Fairy Lake, Hull, Quebec, on June 3, 1929. The bird was observed closely for two hours, during which period it was on the nest several times.

61. *Pipilo erythrophthalmus erythrophthalmus* (Linnaeus). TOWHEE.—C. E. Johnson saw one on four occasions ending with May 16, 1926, at Peat's Island, in the Rideau River, Ottawa South. In the spring of 1929 a Towhee paid us a visit at Rockcliffe Park, and sang cheerily from the tree-tops near the house. Robert Lockwood's records show that it was observed on April 29, 30, May 5, 8 and 9, and not again. R. E. De Lury reports several records for his garden and one for the Experimental Farm.

62. *Passerina cyanea* (Linnaeus). INDIGO BUNTING.—C. E. Johnson found a singing male three miles south of Ottawa on the C.P.R., July 27, 1924. One was singing where I now live at Rockcliffe Park, on June 3, 1927, although they are not often seen in that vicinity. R. E. De Lury found one in his garden several years ago. There are a few scattered stations near Ottawa where the species can be found almost with certainty.

63. *Cardinalis cardinalis cardinalis* (Linnaeus). CARDINAL.—There is no doubt whatever that an example was seen in the Kingston's garden on Argyle Avenue, Ottawa, near the National Museum, on November 28 and 29, 1923. The bird was identified by Miss Lois Kingston,[6] A. G. Kingston, D. Blakely and C. E. Johnson. Like previous occurrences of the species this one was in the city, indicating the likelihood of its being an escaped cage bird and the status of the species as an Ottawa bird is still in doubt. Of course, it has become established at Toronto and may do so here. There is a possibility that this bird survived the winter as it, or another, was seen by J. Phillip Bill as well as by F. W. Waugh near where Bank Street crosses the Rideau Canal, and the occurrence was reported to me verbally. On April 13, 1924, I went there on a telephoned report that Mr. Bill had just seen it, but I failed to find the bird.

64. *Petrochelidon lunifrons lunifrons* (Say). CLIFF SWALLOW.—A few days before June 12, 1929, C. E. Johnson reported that a colony of this species was nest-building beneath the overhanging eaves of a residence at 203 Cameron Street, Ottawa. This residence faces the Tennis Courts, and the nests are being built mostly on the west wall which faces Dow's Swamp. At that time there was also an almost completed nest on the back wall. At a later date Mr. Johnson discovered another nest which was partially hidden by a chimney. These city-dwelling Cliff Swallows could have come from a number of colonies, mostly small, in the surrounding country. There is a colony known to Mr. Johnson four miles from here on the Metcalfe Road. I have a note of a closer nesting site than this, one occupied nest on a barn near Hurdman's Bridge, seen by E. G. White and me on June 3, 1922. On July 4, 1922, two occupied nests were

[6] *C.F.-N.*, 38: 18, Jan., 1924.

noted by Philip Foran and me at the Foran farm, five miles west of Hull, Quebec. On July 28, 1923, I saw an occupied nest at Kingsmere, Quebec, and Robert Lockwood reports a colony at Britannia in the summer of 1927. It is hoped that this species is recovering here from the decrease that it has suffered for many years from no known cause.

65. *Hirundo erythrogastra* Boddaert. BARN SWALLOW.—Late dates are furnished by Harrison F. Lewis who saw two at Dow's Lake on September 28, 1927, and three on September 29, 1927.

66. *Iridoprocne bicolor* (Vieillot). TREE SWALLOW.—P. A. Taverner and I think it quite possible that the migration of this species in the spring of 1928 met with disaster. They came early, and after their arrival the district was visited by two severe cold spells with snow.

67. *Bombycilla cedrorum* (Vieillot). CEDAR WAXWING.—Harrison F. Lewis reports that a flock of twelve was feeding on Mountain Ash berries on his residential grounds, February 9, 1925.

68. *Vireosylva gilva gilva* (Vieillot). WARBLING VIREO.—The credit for definitely finding the first nesting of the species at Ottawa belongs to C. E. Johnson who located a nest with young at Wendover Street and the Rideau River, Ottawa South. The young were left unmolested and the nest collected July 21, 1924, for a museum exhibit. It was in an ash tree overhanging the water.

69. *Dendroica fusca* (Muller). BLACKBURNIAN WARBLER.—Additional breeding dates are furnished by E. G. White, who reports that he saw adults feeding young at Taylor's cottage, South March Township, on July 16, 1924, and again on July 4, 1925.

70. *Anthus rubescens* (Tunstall). PIPIT.—C. E. Johnson reports 200 and more at Britannia, October 8, 1923.

71. *Toxostoma rufum* (Linnaeus). BROWN THRASHER.—Another breeding record is furnished by E. G. White who found a nest in Beechwood cemetery in the spring of 1928.

72. *Cistothorus stellaris* (Naumann). SHORT-BILLED MARSH WREN.—On the evening of June 16, 1929, I took A. G. Lawrence of Winnipeg for a short walk in Rockcliffe Park so that he could hear the song of the Meadowlark. In a dampish hay meadow not more than a quarter of a mile from home we found a Short-billed Marsh Wren in full song, which song was spotted instantly. The bird was identified by us with glasses (x8) at about twelve feet distance, and again by E. G. White and me on the evening of June 20, 1929. There are two previous records of the species at Ottawa.

73. *Sitta carolinensis carolinensis* Latham. WHITE-BREASTED NUTHATCH.—Another nesting date is furnished by C. E. Johnson who located a nest in a high elm at the end of Wendover Street, Ottawa South, on June 10, 1928.

74. *Penthestes hudsonicus hudsonicus* (J. R. Foster). HUDSONIAN CHICKADEE.—While Harrison F. Lewis and Harlow Wright were engaged in taking a Christmas Bird Census they observed one individual near Aylmer, Quebec, on December 26, 1927. On October 24, 1925, I secured two specimens a few miles from Ottawa near the Rideau River.

75. *Regulus satrapa satrapa* Lichtenstein. GOLDEN-CROWNED KINGLET.—Previous lists do not record the occurrences of this species in winter, although it is noted in Christmas Censuses taken at Arnprior. On December 25, 1924, I saw one in the evergreens at Fairy Lake, near Hull, Quebec, when I was on an excursion with Robert Lockwood and H. A. Lloyd. It was at the foot of a tree and gave me a splendid view at close range with field glasses. The crown patch was plainly visible.

On December 26, 1927, two parties on the Christmas Bird Census reported them as follows:

C. E. Johnson, C. M. Sternberg and R. Sternberg (2);

F. H. Ostrom, (7).

The first nest for the district was found at Alcove, Quebec, on July 31, 1929, by D. H. Baker.[7]

76. *Hylocichla mustelina* (Gmelin). WOOD THRUSH.—It was a singing Wood Thrush, in June, 1927, that sold me the site of my present home at Rockcliffe Park, and even at that I was none too sure of the singer, for this song, like others, is forgotten by my poor ear during the long intervals when none is heard. In the spring of 1928 we were living there, and more time was available to get acquainted with this avian real estate agent. It was finally hunted down and identified on May 25, 1928, in fact on that date two singing males were found. On the 26th I saw one while I was having breakfast and Mrs. Lloyd kept track of them during my absence that day and reported that she thought they were nesting. On June 6th my diary records them singing, morning and evening, and at other times on cloudy days. On June 11th one near the house was much agitated when it found a family of seven Screech Owls in its territory. On the same evening a neighbour's boy, William Bell, attended a lecture of mine, and when I showed a picture of the Wood Thrush he told Mrs. Lloyd that he knew where there was a Wood Thrush's

[7] *C.F.-N.*, 43: 207, Dec., 1929.

nest. He proved he was correct the next day when he showed her a nest which contained four eggs, and which was placed in an ironwood sapling five feet from the ground. The male sang near-by while I photographed the female on the nest. On the 24th the young thrushes were well feathered and filled the nest. On the 27th Master Bell and Robert Lockwood reported that they had flown, and that the old ones were laying again. On July 1st the nest contained one egg with a big hole in it and the old birds were nowhere near it.

It was certainly delightful to find this rare Ottawa bird nesting within 150 feet of my house.

R. E. De Lury tells me he found singing Wood Thrushes in this vicinity some three years prior to my location of them.

Robert Lockwood found another nest with four eggs on June 9, 1929, at Rockcliffe Park. It was in a maple sapling about ten feet from the ground. There are about three singing males in the colony near my house.

77. *Hylocichla aliciæ aliciæ* (Baird). GRAY-CHEEKED THRUSH.—So few specimens are recorded from Ottawa, that it is of interest to note that one killed itself by flying against my study window, and was found beneath it on September 22, 1928.

78. *Planesticus migratorius migratorius* (Linnaeus). ROBIN.—Winter occurrences are reported fairly regularly as in the Christmas Bird Censuses. F. H. H. Williamson saw one on the morning of December 14, 1925. In one of the radio lectures on bird topics given by members of the Ottawa Field-Naturalists' Club, chiefly in the winter of 1924-25, C. B. Hutchings gave a report respecting a Robin being in Mrs. R. D. Brown's place every morning for a couple of weeks after January 14, 1925, including one morning when the temperature was thirty degrees below zero F. It came for Mountain Ash berries, and, according to R. E. De Lury, was still there on February 10, 1925. They occur at the Experimental Farm nearly every winter according to R. E. De Lury. He says they swallow whole frozen crab-apples half-an-inch in diameter.

In the spring of 1929 a piebald specimen was seen for several days near the Rideau Bridges, Sussex Street.

79. *Sialia sialis sialis* (Linnaeus). BLUEBIRD.—R. E. De Lury banded one at Hathersall's feeding station, Carleton Avenue, just west of Ottawa on December 21, 1924.[8]

EXTRALIMITAL

80. *Alle alle* (Linnaeus). DOVEKIE.—A Dovekie was shot at Mississippi Lake, Carleton Place, Ontario, the last week in October, 1924. Identification was made by Mr. E. G. White, January 2, 1925, and checked by Mr. P. A. Taverner. I am told that the bird was shot by a Mr. Patterson. Since Carleton Place is a mile or two outside the defined boundaries of the Ottawa area, this occurrence in not included in the Ottawa list.

81. *Branta bernicla glaucogastra* (Brehm). BRANT.—A young bird was shot by Leo McDiarmid at Mississippi Lake, near Carleton Place, Ontario, on November 8, 1926. The specimen was seen in the flesh and identified by Mr. E. G. White. It was mounted and is preserved, and is apparently the first Ottawa district specimen to be saved. The locality is just outside of the defined Ottawa district.

[8] *C.F.-N.*, 39: 24, Jan., 1925.

FOOD OF THE AMERICAN MERGANSER, (MERGUS MERGANSER AMERICANUS) IN BRITISH COLUMBIA

A PRELIMINARY PAPER

By J. A. MUNRO, Chief Federal Migratory Bird Officer for the the Western Provinces, National Parks of Canada, Department of Interior,

and

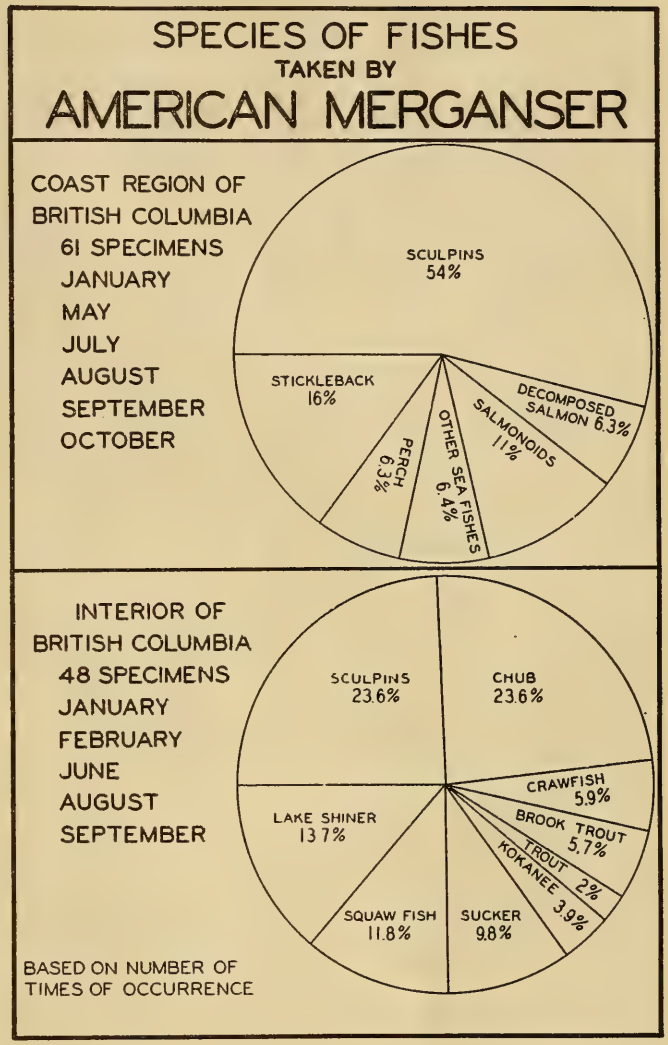
W. A. CLEMENS, Director, Pacific Biological Station, Nanaimo, B.C.

FOR some years there has been considerable public discussion regarding the food habits of those ducks commonly known as mergansers or sawbills. Many persons believe that the feeding habits of the mergansers are very destructive to fishing interests and from time to time have requested the removal of the protection afforded these birds by law or the initiation of such measures as would bring about a large reduction in their numbers. Ornithological or fishery literature, apart from general statements concerning the fish-eating habits of these ducks, contains little precise information on the subject. Therefore, it seemed most desirable that a thorough investigation be made. Accordingly, the Migratory Bird Service of the National Parks of Canada, Department of the Interior, and the Pacific Biological Station of the Biological Board of Canada have undertaken a study of the two common species known as the American Merganser

and the Red-breasted Merganser, based on the analyses of stomach contents and observations in the field.

Up to the present time there have been examined one hundred and fifty-seven stomachs of the American Merganser, which material has been obtained very largly through the courtesy of the Dominion Department of Fisherise to the officers of which sincere thanks are extended. Acknowledgment is also made to the Bureau of Biological Survey, United States Department of Agriculture, Washington, D.C., for the use of certain data pertaining to Okanagan lake.

It has been thought advisable to present this preliminary report of a summary character at the present time and to postpone presentation of a detailed report upon this species and upon the Red-breasted Merganser until much more data have been assembled. It should be pointed out that the two species must be considered separately because of differences in habitats, in breeding ranges, in feeding grounds and in food materials taken. The American Merganser is resident on the lakes and rivers of the coast region and is the species commonly found on the rivers above tidal influence. It breeds in the interior also but winters there only in small numbers. The Red-breasted Merganser, on the other hand, occurs as is relatively small migrant on the interior lakes and rivers, but winters abundantly on the coast. There it is chiefly a bird of the sea, not commonly ascending the rivers above tidal influence. The data concerning the food of the Red-breasted Merganser are not reported upon at the present time since only thirty-six stomachs have been available.



In the following tabulations the specimens have been grouped according to the four localities. It will be noted that most of the months of the year are represented but that there is a lack with respect to the spring months. It is hoped that this deficiency will be met during the next two years. In addition to the tables, diagrams are presented to illustrate the frequency of occurrence of the various species of fishes taken by mergansers in certain lakes and rivers.

FOOD ITEMS, TABULATED

Fifty-six specimens from the Interior of British Columbia collected in January, February, May, July, August, September, October and November.

FOOD ITEMS	*Number of times found*
Sucker, *Catostomus catostomus*	2
Sucker, *Catostomus macrocheilus*	1
Lake Shiner, *Leuciscus balteatus*	9
Chub, *Mylocheilus lateralis*	11
Sculpin, *Cottus asper*	11
Sculpin, *Cottus philonips*	1
Sculpin, unidentified *cottoids*	3
Squawfish, *Ptychocheilus oregonensis*	6
Eastern Speckled Trout, *Salvelinus fontinalis*	3
Trout, *Salmo* sp.	1

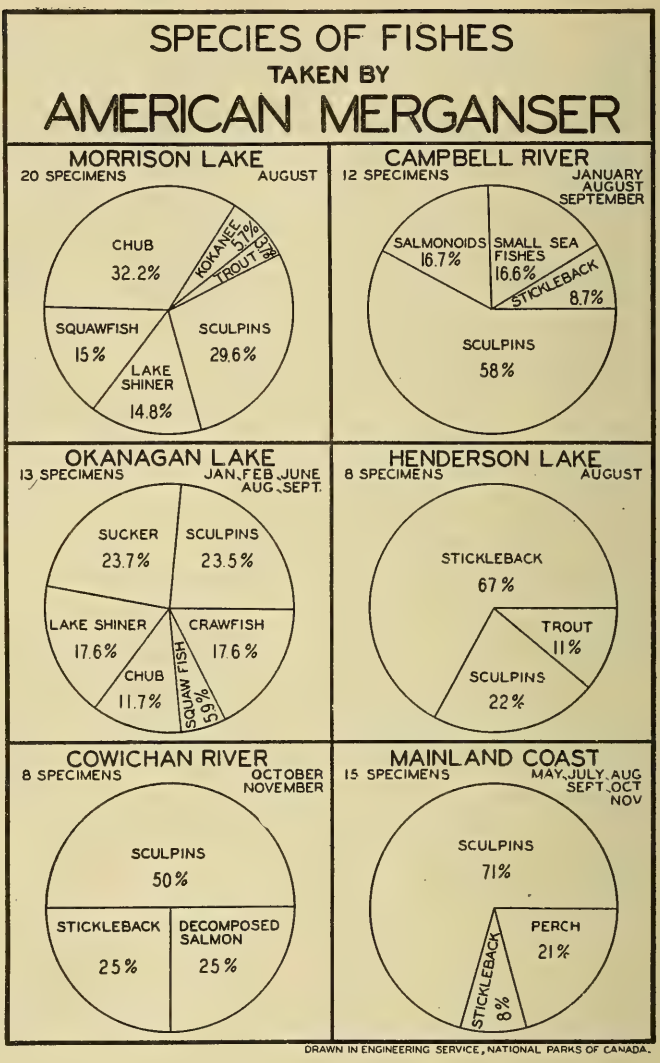
FOOD ITEMS	*Number of times found*
Kokanee, *Oncorhynchus nerka kennerleyi*	2
Salmon eggs (Sockeye?)	9
Crawfish, *Callianassa* sp.	3
Stone fly, *Perla* sp. (larva)	2
Crane fly, *Tipulidae* (adult)	1
Dragon fly, *Odonata* (adult)	1
Fly, *Diptera* (adult)	3
Beetle, *Cerambycidae*	1
Beetle, *Carabidae*	1
Moth, *Lepidoptera*	1
Insect remains not identified	4
Fresh water sponge, *Porifera*	3

Ninteen specimens from mainland coast region collected in January, February, May, July, August, September, October and November.

Sculpin, *Leptocottus armatus*	5
Sculpin, *Cottus asper*	1
Sculpin, *Cottidae*	4
Stickleback, *Gasterosteus cataphractus*	1
Eulachon, *Thaleichthys pacificus*	2
Pipe fish, *Syngnathus griseolineatus*	1
Perch, *Cymatogaster aggregatus*	3
Insects not identified	1
Crustaceans, Isopoda	1
Crustaceans, Amphipoda	1
Salmon eggs	3

Seventy-one specimens from Vancouver island collected in January, August, October, November and December.

Spring salmon, *Oncorhynchus tschawytscha*	1
Steelhead, *Salmo gairdneri*	1
Trout, *Salmo* sp.	1
Stickleback, *Gasterosteus aculeatus*	9
Sculpin, *Cottus asper*	6
Sculpin, *Oligocottus maculosus*	2
Sculpin, *Leptocottus armatus*	1
Sculpin, *Cottidae*, not identified	11
Herring, *Clupea pallasii*	2
Rock Cod, *Sebastodes*, sp.	1
Perch, *Cymatogaster aggregatus*	1
Sand Launce, *Ammodytes personatus*	1
Decomposed salmon	4
Salmon eggs	36
Crab, Decapoda	2
Crustacean, Isopoda	2
Spider, *Arachnida*	1
Caterpillar, Lepidoptera	1
Fly, Diptera (larva)	1
Beetle, Coleoptera	1



FOOD ITEMS	*Number of times found*
Water Strider, Hemiptera	1
Insect fragments not identified	1
Snail, Mollusca	1
Fresh water sponge, *Porifera*	1

Nine specimens from Tlell river, Queen Charlotte Islands, collected in April, May and August.

Trout, *Salmo* sp.	3
Sculpin, *Cottus gulosus*	2
Sculpin, *Cottidae*	3
Sculpin, eggs	1

INFORMATION SERVICE

Answers to questions submitted will be given by specialists in cases where the reply is of general interest. Questions of less general interest will be answered by mail.

Would you kindly advise me where the male hummingbird goes to after the mating season?

Would you also advise me if the robins of Alberta make a temporary migration after the fledglings are able to fly?

The robin population of Alberta appears to be increasing very rapidly. It is no exaggeration to say that there are thousands around this town every spring and summer for the last few years. In the early part of August they disappear and from then on until fall very few are to be seen. The writer does considerable driving through the country and an examination of the woods and thickets reveals the presence of very few robins during the time indicated above.

Any information you can give me on these matters will be greatly appreciated.—A.M., *Lacombe, Alta.*

It is an interesting question where the adult male hummingbirds disappear to in the summer. As soon as serious nesting begins with the female, the male seems to vanish and is never seen in the vicinity of the nest. Thereafter the great majority of the hummers observed are females and young birds. This summer I saw a single adult male in my garden shortly after the middle of August which is the latest I can recall ever having seen one. In British Columbia the common impression is that the males follow the flower season up the mountains to the alpine meadows. Whether this is the result of inference only or of direct observation I do not know, but it cannot be true to the east where there are no mountains; yet the same absence of males can be noted. Perhaps these males return south again as early in the season as their services can be dispensed with.

Of course August is a very quiet time for most birds. As soon as their reproductive duties are over most of them undergo a complete moult, a process that is a considerable tax on their systems. During it they are usually very retiring and quiet and largely disappear from observation. After they acquire a new plumage they become more active again rebuilding their systems for the exertions of migration. At this time many species join together in large flocks before leaving in a body.

Under various local food conditions much of this sequence of retirement, reappearance, flocking and leaving is obscured in the case of the Robin. They are very fond of small fruit and, as soon as such is ripe or the insect or worm requirements of their young are past, subsist upon it almost exclusively. Here in the east Robins consume great quantities of mountain ash, honey-suckle, climbing bitter-sweet berries, wild grapes, apples, etc, They may entirely dssert their familiar habitats and concentrate where such food is available. If the Robins seem to desert your locality in August I should surmise that the above is the reason; they are seeking soft fruit and are likely to be found in some concentration in such sheltered coulees or other localities where such food can be found. The reappearance of the species again in the fall may be due to the passage of northern birds in migration, the exhaustion of the food supply supply elsewhere, or both. In any event it would be an interesting problem for you to work out.—P.A.T.

Will you kindly tell me if any of the eagles line their nests with down (from the mother's breast) and also whether they pull the nests apart later on, in order that the young will learn to fly. I heard these statements made recently and wondered if this is the case.—A. E. McL., *Hamilton, Ont.*

I do not think there is any ground for either of these more or less popular beliefs.

The usual nest of the Bald Eagle is a large mass of sticks, many of them of considerable size, in tops of tall trees or occasionally on ledges of cliffs. With the Golden Eagle the two locations are reversed and the cliff nest is the more usual.

The tops of the nests are usually scarcely, if at all, cupped but merely flat platforms with the interestices filled in with rubbish, grass, and dirt adhering to the roots but contain no more feathers or down than is accidentally worn or dropped from the parents or partially plucked prey they bring.

The young, as they approach flight stage wander over the nest platform and finally work their way to adjoining branches, and, when strong enough, require little or no urging to make their first flight. The whole idea that young birds have to be taught to fly is, I think, wrong. A young bird taking off from the nest for the first time flies perfectly and instinctively, only lacking strength and endurance. Sometimes birds are frightened from the nest or are forced from other causes to leave the nest prematurely and before their muscles are strong enough to support them. It is such flutterings

and the anxiety of the parents to lead them to safety that has suggested that the parents "teach" them to fly. I have seen many birds take their first flight from the nest and, when properly grown, they do so with surprising sureness, and little lack of cordination but tire easily. Normally there is no necessity to force them from the nest, the natural restlessness of growing strength being sufficient urge for them to try their wings.

Nests that have been trampled over for some time by heavy, nearly grown, youngsters are naturally often in need of repair and may be more or less broken down, which may have given rise to the belief that the old birds tear them apart. Nests are occupied year after year and are repaired and added to at the beginning of each nesting season, often assuming immense size through annual accretions.

Intimate and detailed accounts of the home life of the Bald Eagle have been given by Prof. Francer H. Herrick, *Auk*, 41, 1924, and 49, 1932, from observations made from blinds on steel towers purposely erected for the purpose beside tree nests. —P. A. TAVERNER.

ALFRED BROOKER KLUGH

BORN 1882 **DIED 1932**

DR. A. BROOKER KLUGH, Associate Professor of Biology in Queen's University, Kingston, Ontario, died on June 1, 1932, of injuries received earlier in the day when his automobile was struck by a railway train on a level crossing near Kingston. By his death, naturalists and the science of biology suffer a heavy loss.

Alfred Brooker Klugh was born in London, England, in 1882, and received his primary education in a private school in England. He came to Canada with his parents in 1896 and continued his studies with private tutors. He then spent five years at the Ontario Agricultural College, Guelph, and during part of that time was an instructor in nature study and especially ornithology. He entered Queen's University in 1906, graduating in 1910 with the degree of M.A. and with the medal in Botany. In the next session he was appointed lecturer in Biology in Queen's University, and remained on the staff there until his death. He obtained leave of absence to study physiology at Harvard and zoology at Cornell, and received the degree of Ph.D. from the latter in 1926. He is survived by his wife and both his parents.

Dr. Klugh combined in a rare and remarkable degree the traditions of the old school of naturalists, who took all Nature as their field, with the ability for intensive study of the modern, highly specialized scientist. His studies covered every group, from microscopic forms to mammals, and every problem of classification, ecology, distribution, life history, and behaviour. This broad knowledge, available instantly through his accurate memory, was invaluable to him and to his students and formed the foundation for his intensive research on special problems. The results of his studies have appeared in the papers which he contributed to scientific journals, and at the same time he increased the general interest in nature study by articles in more popular magazines. His publications include many series of articles on wild life and nature study, on the distribution, migration, and behaviour of birds, on the distribution and behaviour of animals, on the productivity of lakes and other topics of ecology, on nature photography including colour photography, and on ecological photometry and the measurement of ultraviolet light and the effect of ultraviolet light on plants and animals.

Ecological photometry was latterly his greatest interest. He designed a photometer to measure the intensity of visible and ultraviolet light on land and under water. He found that ultraviolet light has a lethal effect on many small animals in the sea, and he correlated the sensitiveness of these animals to ultraviolet light with their distribution and movements in the sea. He studied the rate of photosynthesis of marine plants in light of different colours, and he correlated this with their colour and the intensity of the light which reaches them at various depths. The scientific and economic importance of his researches were generally recognized, and he received practical and financial assistance from Queen's University, The National Research Council of Canada, and The Biological Board of Canada, the latter body building for his use a special laboratory at the Atlantic Biological Station at St. Andrews, N.B.

Dr. Klugh was not only a student; he was also a teacher. His wide knowledge was always available to his fellow workers and enabled him to direct and assist his students in many fields of biological investigations. But he imparted much more than information and advice to his students; he gave them also an eager enthusiasm in their search for knowledge. It is by his students that his loss will be most keenly felt.—R.O.M.

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FURTHER NOTES ON THE BIRDS, ORCHIDS, FERNS AND BUTTERFLIES OF THE PROVINCE OF QUEBEC, 1931

By HENRY MOUSLEY

CONTINUING my notes from where I left off on October 6, 1930,[1] the season of 1931 did not open too auspiciously, the early spring being wet and cold, besides which, a bad fire lasting for four days burnt out most of our happy hunting grounds at Chambly. On April 19 a nest of the Prairie Horned Lark (*Otocoris alpestris praticola*) at Montreal West, containing three young—almost ready to leave—and one of the Killdeer (*Oxyechus vociferus*) with two eggs were visited, and incidentally, the first Cabbage White Butterfly (*Pieris rapæ*) was seen, this being a real emergence from the chrysalis, and not an example of the many hibernating species, some of which can often be seen on warm days in late winter or early spring, and which the newspapers usually herald in with large head lines. May 2, at St. Rose, was the opening field day of the Province of Quebec Society for the Protection of Birds, when a party of us found four nests of the Bronzed Grackle (*Quiscalus quiscula æneus*), two Killdeer and one Prairie Horned Lark, the two former all containing eggs, the latter young birds which were so beautifully camouflaged that it was a long time before they could be located. The day following found a party of us at Chambly where we were fortunate in finding one Woodcock's (*Philohela minor*) nest containing four fresh eggs, the whole of the woodcock ground with the exception of one small corner having been burnt over by the disastrous fire already mentioned. The Round-leaved Violet (*Viola rotundifolia*) was in prime condition, whilst the first Azure Butterfly (*Lycænopsis pseudargiolus*) was also seen. Two days later, on May 5, another Woodcock's nest was found near St. Lambert but instead of fresh eggs the nest contained only empty egg shells, the young having vacated it quite recently, apparently. A Killdeer's nest not far off contained three eggs.

May 8 found Mr. Wynne-Edwards and myself again at Chambly, photographing the Woodcock on its nest. Thirty-one species of birds were observed, the most interesting being a pair of Red Crossbills (*Loxa curvirostra pusilla*). The day following a party of us journeyed to the St. Andrews Bird Sanctuary, where forty-two species of birds were observed, the most interesting—for these parts—being a Mourning Dove (*Zenaidura macroura carolinensis*). This preservation of some 2,000 acres—situated about thirty-six miles northeast of Montreal at the junction of the Ottawa and North Rivers and in close proximity to Argenteuil Bay—famous for its bird life—really belongs to certain landowners of the village of St. Andrews, Quebec, who, in conjunction with our Bird Society here were fortunate in obtaining an Order-in-Council from the Federal Government at Ottawa constituting the property a Bird Sanctuary, which some day it is hoped may be enlarged and that its example will spread to other localities suitable for such purposes. May 10 was somewhat of a red letter day, as in company with my friend Mr. Napier Smith, I found a nest of Wilson's Snipe (*Capella delicata*) near Lachine containing four young birds just hatching out. Three Killdeer's nests were also visited, all containing eggs. It was on May 13 that I paid another visit to Chambly only to find the remains of a tragedy, one of the Woodcock's eggs being entirely missing, whilst the other three were damaged, one with a hole jabbed in it, the other two with their sides partly crushed in as though they had been trodden upon. What tales of woe we could unfold regarding these poor birds! The little Ram's Head Lady's Slipper (*Cypripedium arietinum*) was just coming into bud. Nine species of warblers were seen, the best for these parts being the Pine Warbler (*Dendroica pinus*). On May 15 a Killdeer's nest with four eggs was found on a coal dump near St. Lambert, in almost the same spot as in 1929. A few plants of Rhodora (*Rhododendron canadense*) were in prime condition.

May 16—On this date the nest of Killdeers found on April 19 near Montreal West now con-

[1] *Can. Field-Nat.*, 46:1, Jan. 1932.

tained three chicks, the fourth hatching out the day following, the last egg having been laid on April 21—incubation thus lasting 26 days. May 19—Nest of Killdeer near Lachine now contained four young birds, just hatched out, incubation in this case having lasted 26 days also. Some nice photographs were obtained of the old bird brooding the young. May 27—On this date I took Bros. Marie-Victorin and Roland to Chambly to see a beautiful stand of the rare little Ram's Head Lady's Slipper which was in the pink of condition. A new station for the Witch-hazel (*Hamamelis virginianus*) was discovered, this being the nearest southern one of Montreal, the nearest northern one being at Oka. Four very interesting abnormal plants of the Wild Sarsaparilla (*Aralia medicaulis*) were also found—close to the Ram's Head Lady's Slipper colony—in which the carpels were transformed into simple leaves, thus giving the inflorescence a very unusual bunchy appearance. May 28—Took several photographs of a Spotted Sandpiper (*Actitis macularia*) incubating her three eggs. I quite as often find this number of eggs comprising a full set as I do the usual four. May 29 was anything but a red letter day, as on visiting the only known station—a very small one—in the Province for the handsome Striped Coral Root (*Corallorrhiza striata*), near St. François de Sales, not a single bloom or sign of a plant could be found, although some plants of the Ram's Head Lady's Slipper—which grow near it—were still in bloom. When I last visited the colony in June, 1929, several plants were then in flower. Let us hope that there are now taking a rest—a thing not unknown to orchidists—and not that the station has been wiped out, which I can hardly imagine seeing that it is known to so few of us. May 30—On this date the second field excursion of members of the Province of Quebec Society for the Protection of Birds was undertaken to St. Andrews Bird Sanctuary, where 57 species of birds were seen, possibly the most interesting find being that of a Yellow Warbler's (*Dendroica æstiva*) nest containing a Cowbird's (*Molothrus ater*) egg, in which no attempt had yet been made to build over the offending egg, as is usual with this species of warbler. Of course there may not have been time to do this, as possibly the Cowbird's egg had only been deposited in the nest that very day. June 3 will ever remain memorable, as I saw for the first time the Putty-root (*Aplectrum hyemale*) in flower—in its only known station in the Province near Oka—but only one example, although, as previously recorded, I had photographed over thirty plants in leaf on October 1, 1930. This is another instance of the vagaries of the orchids for it does not necessarily follow that one, or any of them, will produce blooms the following year or even for some few years to come. In a little bog—not so far from where the Putty-root grows in a large deciduous wood, Arethusa (*Arethusa bulbosa*) was found in prime condition. June 6 saw me again at Oka, when I visited one of the very few stations known in the Province for the rare and curious little walking fern (*Camptosorus rhizophyllus*). It was growing on a rocky bluff in a large deciduous wood, there being three fair-sized mats of it near one of which a fully developed Luna Moth (*Actias luna*) was clinging to the face of the rocks, it being photographed along with the ferns. June 11—On this date I visited Snowdon, a suburb of Montreal, where I found a Northern Yellow-throat's (*Geothlypis trichas brachidactyla*) nest containing a Cowbird's egg, and two of the owner's. Large numbers of Red Admiral (*Pyrameis atalanta*) butterflies were observed, there being quite an exceptional abundance of them this year. June 12 found me visiting another suburb of Montreal, Ville Emard, where under the arches of one of the aqueduct bridges I found five nests of the Cliff Swallow (*Petrochelidon albifrons*), a species I had never before seen in such close proximity to the city. Two nests of the Spotted Sandpiper were also found, each containing a set of three eggs, one set of which I was just in time to see hatch out when I visited the spot again on the 18th. On this last named day I also found a nest of the Rose-breasted Grosbeak (*Hedymeles ludovicianus*), six feet up in a thorn bush, the "singing tree" of the male being just 25 feet away. There were no eggs in the nest at the time, but later, on June 22, it contained two which I luckily photographed as later it was robbed of its contents, the usual fate of most nests in this densely populated area. The day following the finding of the Grosbeaks' nest, or June 19, I again visited Snowdon, just in time to see the egg of the Cowbird—found in the nest of the Yellow-throat on the 11th—hatch out, as well as one of the owner's. From this date onwards to the 28th, I made a study of these warblers playing host to the Cowbird interloper. From July 10–27 I was away from home, spending the time on a large estate some ten miles outside Philadelphia and not far from Norristown, where I observed over forty species of birds, including Bob Whites (*Colinus virginianus*), and best of all two family parties of Bartramian Sandpipers (*Bartramia longicauda*). I had also an opportunity of witnessing the terrible damage done to trees and crops, not only here but in New Jersey also—some 20,000 square miles being affected—by two Japanese beetles (*Popillia japonica* and *Serica*

castanea). At the Philadelphia Electric Company's Delaware Station no less than 410,000 of the former species were trapped in one week. These feed by day, whilst the latter species carry on their depredations at night, hiding under the ground during the day time. In this connection it is interesting to note that birds play an important part in helping to keep down these pests. Over thirty species, from stomach examinations, are known to prey on *Popillia japonica*, the most important—in the order given—being the Purple Grackle (*Quiscalus quiscula quiscula*), Meadowlark (*Sturnella magna*), Starling (*Sturnus vulgaris*), Cardinal (*Richmondena cardinalis*), and Catbird (*Dumetella carolinensis*). It would seem thus as if the flocks of Starlings—which now abound almost everywhere—may after all turn out to be a blessing in disguise, at least in these parts.

August 16—On this date I was out with Mr. Wynne-Edwards at La Prairie, when we saw several interesting shore birds, viz., Dowitcher (*Limnodromus griseus*), Least Sandpiper (*Pisobia minutilla*), Semipalmated Sandpiper (*Ereunetes pusillus*), Solitary Sandpiper (*Tringa solitaria*), Spotted Sandpiper (*Actitis macularia*), Sanderling (*Crocethia alba*), Lesser Yellow-legs (*Totanus flavipes*), Semipalmated Plover (*Charadrius semipalmatus*), Killdeer (*Oxyechus vociferus*), Wilson's Snipe (*Capella delicata*), Black Duck (*Anas rubripes tristis*), and a flock of fifty Blue-winged Teal (*Querquedula discors*), not forgetting also one Northern Phalarope (*Lobipes lobatus*). Large numbers of Savannah Sparrows (*Passerculus sandwichensis savanna*) were also met with.

August 23—On this day I was out with my friend Mr. Terrill near St. Lambert when we saw many nests of the Eastern Goldfinch (*Spinus tristis*), Cedar Waxwing (*Bombycilla cedrorum*), and one of the Black-billed Cuckoo (*Coccyzus erythropthalmus*) containing two young.

August 25–26—Visited the above sites again on both days to find the young Cuckoos now out of the nest, whilst a Goldfinch's nest containing two eggs on the 23rd now had four which were not added to subsequently. These hatched out on September 5, incubation thus lasting fourteen days. From this date (September 5) onwards to the 18th—when the young left the nest—I had an opportunity of making a complete home life study of this species, my two previous studies covering the later stages only. Hunter's butterflies (*Vanessa virginiensis*)—freshly emerged—were seen on some of the above dates. September 29 saw me out with my friend Mr. Wynne-Edward to verify a record he had made the day previous of a Field Sparrow (*Spizella pusilla*) seen with a large flock of White-throated Sparrows (*Zonotrichia albicollis*) in Mount Royal Cemetery. It was most fortunate that after a long search following up the White-throats we at last had an excellent view of the Field Sparrow, the first I had so far seen in the Province. Its bright rufous colour, the absence of spots on its breast, and above all its pinkish or flesh-coloured bill and legs, as well as the rusty cap divided by a grayish central streak, were unmistakable marks, separating it from a young Chipping Sparrow (*Spizella passerina*) with which it might be confused.

September 14–October 7—During these days I paid several visits in company with friends to St. Lambert, on the south shore of the St. Lawrence River, to witness the arrival and settling down of vast flocks of Starlings (*Sturnus vulgaris*) in their roost there of an evening. They used to arrive from all directions in both large and small parties until the evening of October 2, when only about two thousand turned up and these, with the exception of a few hundred, had entirely deserted the roost by October 7, forming another, I think, not far off, before finally departing south for the winter. On one occasion a party of us estimated there must have been between 30,000 and 40,000 birds occupying this roost and yet in 1923 St. Lambert saw its first Starling!

With this almost unbelievable state of affairs I will close my notes for the year 1931, just adding that late in the Fall a large flock of the much despised English Sparrow (*Passer domesticus*)—which consistently frequented the campus of McGill University—was found to be feeding on the buds or seeds of that pernicious weed the Knotgrass (*Polygonum vulgare*), a fact perhaps not generally known or suspected.

METHODS OF INSECT CONTROL IN THE TROPICS

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NO DIRECT application to Canadian conditions is to be expected from the following account of the methods of insect control practised in the tropics, but it is to be hoped that an explanation of the reason for the adoption of those which are unique or peculiar will at least be of interest, while of course there is always the possibility that some hint or suggestion, when expanded or adapted to local conditions, may prove to be of immediate practical value.

The most common practice which one finds in the tropics is that of making no effort to control insect pests. Before condemning too severely the producers of tropical crops for what one imagines they could so easily remedy in numerous cases, one should examine most carefully the economic basis on which they are operating. Where land is cheap and fertile, primitive methods of production, involving little care aside from that incidental to harvesting the crop may often be fully as profitable as the most advanced methods of improved, intensive agriculture. Such apparent lack of care is moreover much more suitable to the temper and stage of development of the country. One should always remember that even when the proprietor of a large hacienda is possessed of an abundance of native intelligence, and often of an education in a modern agricultural college, he nevertheless must entrust the actual execution of his orders to a foreman with no experience outside of his local environment, and to ignorant peons, who can accomplish wonders from generations of experience of wielding a primitive hoe or machete, but are unbelievably stupid when confronted with a spray-pump or dust-gun. Traditional, primitive methods may not be the best, but they certainly are the easiest, and if they have been reasonably profitable in the past, everybody expects that they will continue to be so far into the future.

Seasonal differences of temperature or rainfall so profoundly affect the abundance of insects that growers by long experience have learned not even to attempt the production of certain crops at one season of the year, for it would be entirely destroyed by insect pests. Six months later, however, it can be grown successfully, for its most important insect pest, or some disease transmitted by an insect vector, is not then abundant. Many crops of the tropics grow only in the cool of the mountain heights, or of winter. The cotton caterpillar, *Alabama argillacea*, seems especially sensitive to cold, and entirely disappears from cotton fields after a few cool nights. The various species of *Empoasca* which occur in great abundance on beans during the summer, and besides directly injuring them, also are the vectors of a mosaic or "yellows" disease, are so scarce during the winter, or in the mountains, that beans can be grown at lower temperatures without fear of injury by these leafhoppers.

The variations in rainfall in the tropics are much more marked than those of the temperate zone, and affect insects even more vitally. The red spider of cotton becomes abundant during hot, dry weather, but a few opportune rains cause it almost to disappear. The cacao thrips is a pest only in open, unshaded groves, but where the trees grow close together and humidity remains high, it is unknown as a pest. The moth stalk borer of sugar-cane, *Diatræa saccharalis*, causes enormous damage to cane grown in sections made productive by irrigation, and reaches its maximum abundance where no rainfall occurs, but is scarcest where almost continuous fog, or daily tropical downpours keep the standing stalks continually moist. Of course the cane grower is powerless to affect rainfall, but on large plantations it is often possible to use cane from rainy or foggy sections for seed, which is practically borer-free, while that from dry sections is all ground at the mill.

Another practice most common in the tropics is that of hand collection of injurious insects, rather than their destruction by the use of insecticides. The main reason for this condition is the low price of labour. Native administrators are continually telling you how expensive labour is, as compared with previous years, and even foreigners, who have a higher wage-scale for comparison, will explain how truly expensive is the apparently cheap labour of the tropics. They assert that the tropical labourer is lacking in intelligence, and in muscular strength, so that despite the low wage paid for his services, he is in reality more expensive to employ than the more highly-paid labourers of other countries. But the hand collection of insects makes no considerable demand upon either the intelligence or the strength of the worker, and in the tropics is often much the cheapest way of eliminating them.

Hand collection is most useful when the problem is to get rid of a comparatively small number of large insects, often hard to kill, or even entirely immune to any known insecticide. Large black

rhinoceros beetles, tough of hide, strong and powerful of body, and abundantly armed with horns by means of which they rasp their way into young cocoanut palm trees, leave as an indication of their presence a gaping hole in the ground close beside the young tree whose underground stem they have attacked. Patrolling a young grove in search of such holes, digging out the beetles and destroying them is certainly much the simplest way of eliminating them, when the destruction of the decaying trunks of old trees, within which the larvæ feed, is not possible.

The hoes used in Cuban tobacco plantations have handles not more than a foot and a half long, needlessly painfully back-breaking to the wielder, according to our standards. The growers explain, however, that this brings the eyes of the labourer down close to the ground, where he will the more readily see and destroy any cutworm hiding in the surface soil around the tobacco plant. Despite the fact that most tobacco pests can easily be destroyed by the use of poison insecticides, many growers continue to depend upon hand collection for their control, for this is always safer and simpler, and even cheaper, unless the caterpillars become very numerous.

In other cases, hand collection is used because no known insecticide is effective. Both egg-masses and caterpillars of the moth stalk borer of sugar-cane are collected in Demerara, not occasionally, but as a routine plantation practice. The egg-masses are left exposed in screen cages on posts in the field, from which any caterpillars hatching can not escape, but any parasites emerging can easily fly away to attack fresh clusters. The white grubs of Porto Rico are native species, practically unparasitized and attacked by few vertebrates, and so large and so resistant to such substances a carbon bisulphide and paradichlorobenzine, that an amount sufficient to kill them is not only expensive, but is also toxic to the crop. Foreign parasite introduction has been a failure, for no introduced parasite yet secured has been sufficiently aggressive to kill them, and hand collection continues to be a standard practise in sections where they are most abundant. Cane growers are now planting varieties of cane with a more vigorous root system, but this is the only change in a generation in methods of white grub control on even the most progressive plantations.

Cotton stainers, *Dysdercus* spp., are easily collected, and by starting collections early in the season while they are still scarce, can be prevented from ever becoming a pest. The corm borer of bananas, *Cosmopolites sordidus*, can be attracted to traps, consisting of slices of the injured corms that have been dug out, and by persistent daily collections its numbers can be reduced to negligible proportions, and maintained at this non-injurious status as long as the collections are continued.

Cheap labour not only makes hand collection possible but also influences methods of application of insecticides. The "changa" or mole-cricket of Porto Rico, which has a wide range in tropical and sub-tropical America, but is sufficiently abundant to be commonly injurious only in Porto Rico, is there controlled by placing a ring of poisoned flour around each tobacco plant when it is transplanted to the field. In gardens, flower beds are surrounded by rows of bottles perpendicularly stuck into the ground, or by concrete barriers, but more often all plants are grown in five-gallon cans. By far the most interesting hand methods of control against any insect are those in common use against leaf-cutter ant, *Atta sexdens*, on the headwaters of the Amazon. The ant will not pass a barrier of fresh banana leaves, and citrus and avocado growers tie a fresh band of leaves round their trees every two or three days. Just think what this involves, for if neglected a day too long, the peon will wake in the morning to find a tree completely denuded of leaves, all having been carried away by the ants under cover of darkness. It is possible to destroy colonies of these ants by forcing calcium cyanide dust into their burrows, but where labour is cheap and poison and pumps are expensive, the peon growers continue to let the ants live, a continual threat to their groves.

Some insect pests are most destructive in the temperate zones, but are so scarce in the tropics as rarely to cause injury. In the case of the chinch bug, for instance, this appears to be due in part at least to the abundance of lizards. In regions where the entomologist rarely collects *Blissus leucopterus*, the stomachs of ground-inhabiting lizards will be found to contain a surprisingly large number of them, and only in regions where lizards are scarce does the chinch bug become sufficiently numerous to attract attention. White grubs are so destructive in Porto Rico largely because they have so few natural enemies, and in others of the West Indies where the little burrowing owls occur, comparable species of *Lachnosterna* are rarely to be found. The insect parasites of *Lachnosterna* are also much more numerous in other islands of the West Indies, this possibly being a result of the too intensive cultivation of Porto Rico and the consequent disappearance of some native plant which furnished food for the adult *Tiphia* wasps.

It is only rarely that the casual observer can

readily see the results of parasite attack. In a papaya grove, however, one finds dozens of beautiful, glistening white, silken, hollow cylinders—the cocoon masses formed by hundreds of *Apanteles* grubs that have so completely destroyed a papaya sphinx caterpillar that its empty skin soon falls away, leaving only the glistening cylinder of cocoons.

At various times, the use of fungous diseases for the control of insect pests has been advocated with enthusiasm, but there seems to be no instance of its proving practical in temperate climates. Indeed it is in the tropics that conditions seem to have been most favourable to its success on a commercial scale, and it was in Trinidad that methods of artificially producing spores on a large scale were developed. For many years the sugar-cane in Trinidad had increasingly suffered from a blight, of which the cause was finally (but somewhat tentatively) determined to be a bright orange and black sucking insect, a froghopper. The Green Muscardine, a fungus which attacks many kinds of soil-inhabiting insects, thrives under the humid soil conditions of Trinidad cane fields, and rapidly destroys large numbers of froghoppers. Estate managers erected large cabinets in which the fungus could be grown artificially on thin sheets of boiled rice, and for a few years the wide dissemination of Green Muscardine spores in the cane fields was almost universally practised. As a result of all this activity, however, little difference in the amount of cane blight was to be observed, and it is now generally conceded that soil conditions are largely responsible for the blight, although its intensity is markedly increased by an abundance of froghoppers. Similar cabinets, patterned after those perfected in Trinidad, have been used for growing this fungus to attack white grubs, both in Illinois and in Porto Rico, but the results have never been sufficiently encouraging to warrant their more extensive adoption.

The really practical use of fungous diseases for insect control has, however, found wide application in citrus groves, more especially in the years before convenient concentrated oil emulsion sprays had been developed for destroying scale insects. In young groves, banana plants are set out at the same time as the young citrus trees, and bamboos or some quick-growing leguminous trees form more permanent windbreaks as the trees become somewhat larger. Maintaining a high humidity in the grove furnishes the optimum conditions for fungous growth, and while the trees are not entirely free from scale insects, yet the scales are so largely killed by the fungi that for practical purposes they do little injury. When the citrus trees became of large size, they themselves formed a sufficient windbreak, and the bamboos or other trees could them be removed. The maturing of the groves in Cuba and Porto Rico often coincided, however, with the introduction of a new disease—citrus scab, for the control of which less humid conditions were essential. Spraying with Bordeaux naturally killed the entomogenous fungi as well as those causing the scab, so the growers once committed to spraying against disease, had to follow with a spray against scale insects.

The development in Florida of an effective oil spray against the citrus scales in the humid groves of that State, and the extension of its use in Cuba and Porto Rico, only to be much more widely used in the temperate zone, is possibly unique, but many insecticides find novel application in the tropics. Calcium cyanide, for instance, finds a wide use against leaf-cutter ants, of which previously there had been no effective method of destruction. The so-called West Indian cane "fly", or leafhopper, (which is really a Fulgorid or Delphacid), in past years has caused tragic losses, especially when attacking very young cane shoots, and against it there was no protection. To be sure, it is very scarce in some of the West Indies, presumably being under control by parasites there. The importance of this, in making possible foreign parasite introductions into the islands where it is a scourge, was not realized, however, and the ease with which it can be controlled by dusting with calcium cyanide makes any such measures superfluous now.

Airplane dusting, although originated in Ohio, is being used most extensively at the present time in the control of cotton insects, not only in the southern United States, but also along the west coast of South America. Peru has more kinds of serious insect pests attacking cotton than any other country. To be sure, its boll weevil is smaller than *Anthonomus grandis*, and attacks only squares, but a native leaf caterpillar is abundant in regions too cold for the common tropical species to inhabit. Against all three of these insects airplane dusting of calcium arsenate is a common and most profitable commercial practice. The cotton stainer of Peru, although susceptible to control by hand collection when present in small numbers, is much larger and stronger of flight than any West Indian species. Enormous numbers develop each year on native food plants in the foothills of the Andes and when this supply of food is exhausted, migrate in swarms looking like a black cloud in the sky, to the cotton fields of the coast. The planters

could not hope to cope with such invasions by any means at their disposal up to a few years ago. The availability of airplanes for dusting large areas in a short period of time, however, and a new insecticide developed in Germany, the fumes of which kill the stainers immediately, rob such mass migrations of these big bugs of their former peril. Calcium cyanide, applied by hand dusters, is also effective in killing the stainers, but its application by airplane has not been attempted. The patented German preparation, locally called "polvos violetas", is of a delicate lavender colour, and although so toxic to the stainers, is imperceptible to the human observer watching in the field below when the airplane sails by overhead.

Host resistance to plant disease is much more common than a comparable varietal immunity to insect attack. Yet in the tropics one is continually hearing of certain varieties of sweet potatoes, for instance, which are rarely or not at all infested by the weevil, *Cylas formicarius*. When planted a second time, however, or in carefully checked experiments, the supposed immunity is found to be slight or non-existent. On the contrary, some kinds of bananas are practically immune to the corm borer, and rapidly displace the heavily infested kinds when this pest first appears in a region. The most interesting case of host immunity is that of the native cotton of Haiti to the pink bollworm. The kind of cotton which is most extensively grown in central and southern Haiti is so well adapted to local conditions of climate that no matter when it is planted, bolls appear only at the beginning of winter, and all have matured within two months. It is true that this gives a very short season in which the caterpillars of the pink bollworm can develop, and a very long period during which no bolls of native cotton are available on which they can feed, yet enough wild or volunteer plants of other varieties are present to supply at least a few bolls at all seasons of the year. Thus any immunity to the pink bollworm shown by native cotton is real, the surest proof of this being that cotton production has shown no decrease since the advent of the pink bollworm in Haiti over seven years ago, despite the absence of any attempt to avoid its injuries.

"SAMSON'S SHOULDER STONE" AN ERRATIC NEAR PERTH, LANARK COUNTY, ONTARIO

By M. E. WILSON

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ABOUT seven miles northeast of the town of Perth, Lanark County, Ontario, on the south side of the county road that follows the first concession line of Drummond township the boulder known locally as "Samson's Shoulder Stone" shown in Figure 1 stands up conspicuously in an otherwise flat pasture. The interesting feature about this boulder is that it consists of variegated and banded gneiss belonging to the Pre-Cambrian of the Canadian Shield and rests on flat bedded (Palæozoic) limestone, a rock of entirely different character and much younger age. The nearest outcrops of Pre-Cambrian gneiss from which this boulder could have been derived lie in the Laurentian highlands of Quebec about 50 miles to the north, but it is possible that its source is far beyond this point. How was this large boulder transported all this distance? Geologists believe that this erratic, as such boulders are called, was carried into its present position by the great ice sheet. As the ice mass moved southward boulders of the underlying rocks of the Shield became embedded in the ice and were deposited, as in this case, whenever they happened to be when the ice sheet, due to the moderating climate, ceased to move and finally melted away.

"Samson's Shoulder Stone" is an example of a phenomenon that can be observed almost anywhere in Canada. For example, a rock known as jasper conglomerate, an ancient gravel now consolidated, occurs extensively in the region extending northeasterly from the north shore of Lake Huron to Lake Timiskaming. A habitant, living near Ville Marie, on the east side of Lake Timiskaming, once described this conglomerate to the writer as "candy rock", a name suggested to him, no doubt, by the similarity of the pebbles of quartz and varicoloured jasper contained in the conglomerate to the mixed red and white candy sold in the stores of Ville Marie. From the north shore of Lake Huron southward the bedrock everywhere is nearly flat-lying limestone shale or dolomite, yet at the town of Kingsville in Essex County, Ontario, boulders of jasper conglomerate obtained from glacial deposits nearby are exceedingly common in the foundations of buildings. In this case the boulders have been transported at least 300 miles. By means of the erratics of unusual rock that occur in restricted

FIGURE 1.—*"Samson's Shoulder Stone"*

areas, such as the jasper conglomerate, it is possibe to determine the direction of movement of the ice sheet with considerable detail.

"Samson's Shoulder Stone" lies scarcely more than 100 feet south of the county road from Perth to Franktown, at the point where it turns northeasterly with a diagonal course across the second concession of Drummond township. This highway by way of Franktown and Richmond is the original stage road from Perth to Ottawa, and because it is by far the shortest route, will probably, in time, become a provincial highway. The "Shoulder Stone" therefore, although now in an easily accessible locality, may eventually become even more accessible.

THE RED-BACKED VOLE (Clethrionomys gapperi loringi Bailey) IN SOUTHERN MANITOBA

By STUART CRIDDLE, Treesbank, Manitoba

SO MUCH has been written about the Red-backed and other Voles by eminent mammalogists that I have hesitated to add my observations to those already published, but while the general habits of any one species should be, and generally are, similar, minor differences nearly always occur when the animals live under different climatic conditions. Therefore, since the habits of the Red-backed Vole have not previously been studied in Manitoba it is hoped that the following notes will prove of some interest.

While the Red-backed Vole has been recognised by my brothers and me for about forty years, a study of its innumerable activities did not commence until 1905, while even to 1915 observations were only carried on in a sporadic manner. After the latter date the study was held in abeyance until my return from the war. In 1923 I began making observations on caged voles with the object of comparing their food and other habits with those living under natural conditions and on July 1, 1928, I commenced keeping a daily record of all the small mammals caught by my brothers Norman and Evelyn, my sister Maida and me. The animals were examined for age and sex and the measurements and weights of many adults taken, while during the breeding season all females were dissected and the ovaries inspected. By the end of 1931, 4306 animals had passed through my hands among which there were 462 Red-backed Voles comprising 212 males and 250 females.

Although most of the work in connection with

this study has been carried on within a few miles of my home at Aweme, occasional excursions were made into distant parts of the province. These excursions, however, were more with the object of ascertaining the range of the animal and of discovering whether more than one race occurred within our boundaries, than with the idea of making a study of their habits, although the last consideration was always kept in view.

The Red-backed Vole has, perhaps, the most descriptive common name of any of our small mammals and as a rule it can be told at once by its rich reddish-brown back which though lighter in winter is still conspicuous enough to identify the animal by. The red on the back blends into grey low on the sides and this colour to ash white on the under parts.

Measurements.—All the following measurements are in millimetres and the weights in grams: Average of 45 adult males: Total length, 128.8; tail vertebræ, 34.3; hind foot, 17.8; ear, 12.9; weight, 13.62. Largest male: length, 145; tail, 41.2; foot, 18.1; ear, 11.4; weight, 19.10. Average of 40 adult females: Length, 127.6; tail, 31.6; foot, 16.6; ear, 12.8; weight, 16.97. An unusually large female, not included above, was caught on September 5, 1928; she measured: Length, 156.2; tail, 44.6; foot, 18.8; ear, 14.3; weight, 27.29. This female was nearly as large as a race of Red-backed Voles found in the Sandilands Forest Reserve, the largest of three females from there being: Total length, 155.5; tail, 46.4; foot, 18.5; ear, 16.5; weight, 33.55. The larger of the two males from the same locality was: Length, 157; tail, 48.5; foot, 20.5; ear, 16.5; weight, 33.88. Besides being much larger, this race is decidedly darker than the one taken at Aweme.

Distribution.—In Manitoba the Red-backed Vole is to be found in most of the wooded and semi-wooded parts. I have taken it in the following places: Aweme, Treesbank, Douglas, Kenton, Ninette, Melita, Sandilands and South Junction. Specimens have been sent to me by Mr. P. E. Cole, Hilbre; Capt. K. P. Darnell, South Junction; and Mr. H. U. Green, Riding Mountain. All those examined by me, except the five from Sandilands, appear to be typical *loringi*.

Breeding and Young.—The number of litters brought forth in the course of a year is not definitely known but there are at least four. One of my captive females gave birth to six young on May 2, five on the 26th and 4 on July 2. Although none of my caged young have bred in the first year it seems probable that they might have done so under natural conditions.

My records of young found in the nest and from the examination of the uterus, show that, when the weather conditions are favourable, the breeding season begins early in April and continues through the intervening months until the middle of September. While it is possible that as many as eight are born at one time to one female, my records do not show an excess of six, while the average litter is about four.

At birth the young are deep pink, or reddish. They are without hair, blind and toothless and weigh about 1.25 grams. By the ninth day hair begins to show through the skin along the back. Three days later they are covered by short hair and their eyes begin to open. They are then able to crawl, although with some difficulty. From now on development is more rapid and when about three weeks of age the young are able to leave the nest and take care of themselves.

Nests.—It would appear from the odd places in which the nests of these voles are found, and from the material used in their construction, that these rodents have little preference for either site or material. When possible, the discarded holes and nests of other animals are utilized, but when these are not available advantage is taken of any other available cover such as fallen trees or rotten logs. Heaps of straw or, indeed, any pile of rubbish is used to make a home in, while in winter the nest is often constructed beneath the snow on the bare ground without any other covering than that afforded by the snow. Both the winter and summer nests are, as a rule, quite scanty affairs and they usually consist of a few dry leaves or blades of grass drawn together without being cut up or finely shredded. Occasionally, however, a nest is found which has been made with greater care and which is both neat and warm. Such nests, it would appear, are made for the reception of young, although, strangely enough, they are always found in exposed positions without the substantial covering of logs, etc. The reason for the scanty winter nests seems to be that the voles live in little colonies at that time and that they keep warm by close contact. The nests are nearly always surrounded by numerous runways and occasional tunnels into which the animals dart at the least alarm.

Food.—As the plants upon which the Red-backed Vole depends for food are very largely affected by climatic conditions, we should expect, and actually find, that this rodent's food habits change to a marked degree with the seasons. This change is naturally most contrasting during the extremes of summer and winter, in other words during the growing or dormant periods of vegetation. As a rule the winter months, from the voles' point of view, are likewise divided into two parts depend-

ing on whether the ground is covered, or not, with snow. During the growing seasons this rodent lives, to a large extent, on the petioles of broad leaved plants, the leaves themselves being usually discarded. The diet during the snowless period of the winter is mostly made up of those plants which remain green, such as biennials and perennials, while during the snow period the bark of many species of shrubs and trees is eaten.

Apart from the general food habits outlined above these animals also eat the seeds of many wild plants as well as oats, barley, wheat, rye and flax. During spring time the tender shoots of many grasses are consumed, of which blue grass (*Poa*) and brome grass (*Bromus enermis*) prove to be the most palatable. Fruits are likewise relished; this applies particularly to strawberries and in the fall many vegetables suffer from the voles' attack; these include carrots, parsnips, potatoes and turnips. Finally there appears to be a decided taste for flesh and, like various other voles, these rodents have a marked cannibalistic tendency and they readily devour their own kind or their allies when these are found freshly killed.

Our records show that during the months of snow the Red-backed Vole feeds extensively, or often exclusively, on the bark of many kinds of small trees and shrubs and that it has little preference for any one species, although there are a few that it seldom or never touches. At Aweme we have frequently found it feeding on the bark of the following trees or shrubs: Crab apple, Manitoba maple, green ash, aspen poplar, bur oak, choke-cherry, silverberry, and hazel, while many others were attacked to a lesser extent.

There is no evidence to show that the Red-backed Vole stores food for winter or, when living under natural conditions, at any other time of the year and we have come to the conclusion that the small piles of leaves occasionally found at the entrances of its dwellings are merely the remnants of plants in which the stalks had been eaten and the rest discarded. For a number of years, some of these voles have lived, off and on, under our bird bath which is only a few feet from the front door of the house. Thus we have been able to watch them very closely while they played about on the stones, climbed up for a drink or gathered to eat their food. We noted that the food was always taken to the entrance of a hole to be eaten and dropped when one of the many false alarms sent them scampering out of sight. They were never seen to fill their cheeks with food or in any other way to take it into their burrows. While, however, we have no evidence of their storing food when living under natural conditions, our caged animals have resorted to this practise when surplus grain was available. This appears to be due to the confined space in which they were kept, where there was little room in which to work off their abundant energy.

Economic Importance.—Early observations combined with the accumulation of evidence from more careful studies later on, made it evident either that the habits of the Red-backed Vole and those of *Microtus pennsylvanicus* had been confused, or that they differed very markedly in Manitoba from those in eastern parts of the continent. In other words it was found that while the Red-backed Vole was an inveterate eater of the green bark of trees, *Microtus p. drummondi* only indulged in the habit on rare occasions or under abnormal conditions. This finding naturally places a greater importance on the economic standing of the red-back than if it had serious competitors in the bark-eating habit.

The real outstanding economic importance of the Red-backed Vole relates to its habit of feeding upon the bark of shrubs and trees during the months of snow. While, however, this bark-eating habit had long been known to us it did not begin to attract general attention until the introduction of shelter belts around the farm buildings and their enclosed gardens and orchards. Such shelter belts are frequently surrounded with thick grass and weeds with an occasional heap of brush or rubbish. Here the voles live and rear their young in comparative safety and then, when the snow comes, they leave their summer haunts and make tunnels far into the open spaces. They soon discover where the best food is to be found and near this a temporary nest is built while a labyrinth of tunnels is made leading from it among the surrounding herbage. As the food supply becomes exhausted the voles shift their quarters and build a new nest and so continue their insiduous operations until the thawing of the snow once more drives them back to their summer haunts. Perhaps, during all this time the animals' presence has not even been suspected but as the snow melts the havoc done is no longer in doubt. There lie the remnants of many herbaceous plants such as Sweet William, pinks, and many more while among the surrounding trees and shrubs many show those white rings characteristic of the red-backs' activities.

While the damage done to trees under natural conditions is seldom as great as that done to shelter belts and orchards it is, nevertheless, at times considerable. During the winter of 1922-23 for example, over fifty per cent of the young Manitoba maple trees in patches along the Assiniboine River were killed, many of which were an inch or more in diameter. In the Sandilands Forest

Reserve in 1929 I discovered that at least 95 per cent of the green ash along the banks of the Whitemouth River had been girdled during the previous winter. Some of these trees were nearly three inches through. On the ridges, under the jack pines, large patches of blueberry shrubs were eaten to the ground and in June these voles were largely feeding on the new shoots of that plant. Later during the month of July the district was again visited and then these animals were found to be feeding upon the ripening fruit as well as on the new growth. Thus it will be seen that the blueberry provided them with food throughout the entire year.

During the winter of 1927-28 a colony of these rodents was kept under close observation; they were living among a clump of 327 choke-cherry trees and had their nest in a gopher hole. It was observed that they were feeding upon the bark of the cherries early in November and that they continued doing so until the melting of the snow in late March. During this time they girdled 187 of the trees and damaged 34 others.

Although the damage done to grass-lands seems always referable to Drummond's Vole, we have found some exception in the case of damage to alfalfa and sweet clover in which injury the red-back certainly plays a part, and to this damage should be added a small loss to grain when the stooks are left unduly long in the field and the latter are close to bushes. These losses, however, are comparatively light and the real economic importance of the Red-backed Vole is more definitely associated with silviculture and horticulture than with agriculture.

Control.—All mice have their years of abundance and rarity; these fluctuations are brought about in many ways, a number of which are still poorly understood. That predators once played an important role in keeping such animals within bounds is unquestionable, although there were times when even these failed to check their increase which usually ended through the agency of some virulent disease. That weasels, foxes, coyotes and birds of prey are our valuable allies in reducing rodent pests is obvious but the persecution to which these have been subjected has reduced them to such a remnant of their former numbers that we are now obliged to turn to other means of keeping the rodent population within bounds. Of these means, a brief outline of those found most profitable is presented below.

Many kinds of trap are now on the market for catching mice, most of which are satisfactory when baited with suitable material. For summer use any of the following baits will be found satisfactory: New bread with new, salted butter; barley, oats or oatmeal; sunflower or melon seeds. In winter flesh, cheese, suet, raisins and carrots are all good. The flesh and sugar-containing baits, however, are less useful in summer time because they attract ants.

Grain treated with one of the commercial gopher poisons, or with strychnine, gives good results but a stronger dosage of poison is necessary because the voles discard the bran and only eat the flour. Such poisoned grain should be placed in shallow containers to prevent its coming in contact with the ground and it should be carefully shielded to prevent birds getting at it.

Precautions and Protection.—Perhaps one of the most useful means of guarding against injury by the Red-backed Vole is to destroy its usual hiding places. This implies cleaning up all rubbish and burning the grass in which the animals hide. We have to remember, however, that they often travel a considerable distance, even after there is snow upon the ground, but as the travelling is generally done beneath the snow the voles can be greatly checked in their tunnel-making by treading the snow down firmly around the plants to be protected. This practice should be repeated several times in order to create a firm barrier. Individual plants or trees may be protected in the established way by placing metal collars round them, or by wrapping them with stiff paper.

I have found a well-trampled path to be a very useful means of detecting the presence of mice and voles, due to the fact that these animals are unable to tunnel through the packed snow and they consequently pass over it, leaving their exit and entrance holes on either side. A few traps placed at such crossings usually account for a majority of the rodents using them.

NOTES ON SOME RARE BIRDS IN THE MONTREAL DISTRICT

By V. C. WYNNE-EDWARDS

NORTHERN PHALAROPE (*Lobipes lobatus*).—We are accustomed to think the Northern Phalarope a rare or casual visitor to the Montreal district; it seems, therefore, worth recording that I saw one at Laprairie on August 16th, 1931; two on the 22nd; and two (or more) on September 1st. Mr. Henry Mousley was with me on the first occasion, when we saw in all thirteen species

of Shore Birds.

RING-BILLED GULL (*Larus delawarensis*).—This gull has apparently escaped notice in the Montreal district.* Wintle (*Birds of Montreal* 1896) describes it as a "transient visitant, scarce," but owing to its resemblance to the Herring Gull (*L. a. argentatus*) "probably commoner than we know at present." The same confusion exists in England between the Herring Gull and the Common Gull (*L. canus*), of which *delawarensis* is the counterpart in eastern Canada.

I first identified an immature bird at Laprairie on September 14th, 1931, after scrutinizing every large gull I had seen for twelve months; another was seen at St. Lambert on the 18th; over a dozen, both adults and immature, at Ste. Anne-de-Bellevue on the 25th; and one immature bird at Laprairie on October 2nd. Mr. Terrill was with me when we saw the latter. The immature birds are easily distinguished: they are lighter-coloured and more speckled above than the Herring Gulls, the contrast between the dark primaries and the rest of the wing is more pronounced. The best field-character, however, is the broad sub-terminal dark brown band across the tail (exactly as in the Common Gull), which is utterly different from the evenly graded colour of the immature Herring Gull's tail, resembling rather the smaller gulls, *e.g.*, the Kittiwake, Black-headed and Bonaparte's. The adults are difficult to separate, being nearer the Herring Gull in size even than the Common Gull. When they can be made out, the ringed bill and yellow legs are, of course, diagnostic.

TOWHEE (*Pipilo e. erythrophthalmus*).—On April 12th, 1931, I saw a male Towhee on Mount Royal. Although this bird is so distinctive in appearance I wrote down a detailed description of it on the spot, in accordance with my invariable custom on seeing a new or unusual species. The back was not dead black, but obscurely streaked with dull black on very dark sepia brown, so the bird was probably in its first year. In addition to the call-note, which may be written:

"whee, to - whee,"

the bird sang several times:

"te - hur - wheee-e-e-e-e-e-e-e-e,"

sometimes doubling the initial *"te"*. I observed it for about twenty minutes, quietly feeding with a flock of Juncos, and again about an hour later I saw it for a few moments.

FIELD SAPRROW (*Spizella p. pusilla*).—On September 22nd, 1930, I saw a single Field Sparrow at Senneville, near Ste. Anne-de-Bellevue. I was immediately attracted by the red beak among other distinctive characters; I made a careful description, which shows that the bird was in winter plumage, the rufous crown being divided by a median greyish stripe.

On the 26th I saw a second at Montreal North.

At that time I had been only a fortnight in Canada, and was consequently diffident about recording sight-observations of so unusual a bird. Since then I have kept careful watch, rewarded on September 27th this year (1931) by another single individual with a flock of White-throated Sparrows near the summit of Mount Royal. At that time I had been unable to find any concrete case of this species being taken in the Province of Quebec, and being perfectly sure that I had made no mistake, I wished to obtain confirmation. On September 29th, I therefore invited Mr. Henry Mousley, who was naturally most sceptical, to come with me and make another search on Mount Royal. By great good fortune we were successful, and obtained a clear unobstructed view of a single bird under perfect conditions, about half-a-mile from the place where I had made my observation two days before. Mr. Mousley recognized the bird at once, and wishes to share the responsibility for the sight-record with me.

The beak, which looks a light chestnut-red in the field, is, of course, an excellent character for field-identification; additional confirmation is given by the flesh-coloured legs. Both the Chipping and Field Sparrows, the only local species which in the least resemble it, have blackish legs.

The closeness of the dates on which these birds were seen in 1930 and 1931 suggests that the Field Sparrow is a passage migrant here and not a summer resident. Mr. P. A. Taverner informs me that it has been taken at Ottawa and at Kazabazua, Que., about fifty miles further north. We shall try to obtain a specimen during the next few years.

SHORT-BILLED MARSH WREN (*Cistothorus stellaris*).—I had an excellent close-up view of a Short-billed Marsh Wren in a piece of rough swampy pasture near L'Abord-a-Plouffe, Isle Jesus, on September 21st, 1930, within ten miles of the city. One breeding station for this species on the south side of the river has been known to Mr. L. MacI. Terrill for many years, but it is decidedly rare here.

I saw a pair and heard the male singing his harsh monotonous un-wrenlike song at the south end of Little Lake Magog near Katevale, Stanstead County, on June 25th, 1931, and several subsequent days, but failed to locate their nest. This is not far from the place where Mr. Mousley made the first record for the province.

*Mr. L. MacI. Terrill informs me that he has one or two records from here.

OTHER SPECIES:

BOHEMIAN WAXWINGS (*Bombycilla g. garrulus*) were seen on Mount Royal on November 23rd (two) and 29th (thirty), 1930. Particulars of these observations were sent to Dr. Harrison F. Lewis. I saw two Snowy Owls (*Nyctea nyctea*) at Cote-de-Liesse on January 2nd, and about eight Lapland Buntings (*Calcarius l. lapponicus*) at Cote-St.-Michel on January 30th, 1931, in company with Snow Buntings and Horned Larks (*O. a. alpestris*). These places are all on the Island of Montreal.

I might add that these observations were made with the help of a pair of Zeiss "Delactis" 8× 40 mm. glasses, which are probably unsurpassed for ornithological work.

*HOW DEER RESPOND TO KINDNESS IF TAKEN WHEN YOUNG**

By ALFRED KAY

IT IS remarkable how wild creatures respond to kindness. The following incident, which illustrates this, happened in 1867. In August of that year my friends the Darlings of Aspdin, township of Sisted, Muskoka, Ontario, whom I was visiting at the time, caught a fawn in Skeleton Lake. While picnicking on the shore of this lake they heard a collie dog giving tongue after something, and in a short time they saw some small object bobbing about a good way out in the lake, so they got into their canoes and went out to see what it was, and found that it was a small fawn. It seemed to be quite bewildered, so far out from shore. It was, no doubt, what the dog had been running and the natural instinct made it take to the water to get rid of the dog, only to be faced with the danger of drowning from the waves breaking over its head. So they picked the little thing up out of the lake and took it to shore. They carried it in their arms four miles home. They offered it some milk in a saucer which it licked up greedily. By the next day, when it found no one harmed it, and that it got all the good new milk it could drink, it got quite tame and soon got to look upon everyone there, even their collie dog, as friends.

Kitty, as they named her, was beautifully spotted, and with her soft, brown, expressive eyes she was as beautiful a creature as anyone could wish to see. Her senses of hearing, smell and sight were very keen. It was interesting to watch the bright-eyed creature, and to see the trust she placed in, and the love she had for, all the people she knew, and the different animals on the farm. She grew rapidly and would run about the fields, but at any sign of danger would make for the house or stable, or run to someone she knew. She seemed to look to human beings mostly for protection.

She liked to be petted and fondled. She was very fond of tobacco, and if she smelled tobacco on a man's hands she would lick them as long as they would let her. She was shut in the horse stable at night, for fear strange dogs would get after her. As soon as she was let out in the morning she would make for the house, and paw at the door; if no one was there to open it, she would go to the girls' bedroom window, which was on the ground floor, and tap at the window pane with her nose, and the girls would soon let her in, and give her a drink of milk and a piece of bread. She always looked for a lot of petting in the morning.

One day in October the boys let two hounds loose for exercise, and though they knew Kitty well and would not have done any harm to her they got her running and she took to the bush with the hounds in full cry, running just for sport, but Kitty became frightened and ran for her life. After a long run she made back for home and tried to get into the stable, but the door was shut, and away she went again. We tried to stop the dogs, but could not. Soon we heard the hounds baying in one place, so the boys ran there and found Kitty standing up to her back in the middle of a creek with the hounds standing on the bank baying at her. One of the boys waded in and led her out while the other drove off the hounds, who looked quite ashamed of themselves; and they all walked home together good friends, and none the worse for their frolic.

The horses seemed to get very fond of her for when winter set in Kitty would stand up between the horses and eat with them out of their manger, and not once did they try to bite or kick her. But a sad day was coming. A neighbour who lived a few miles to the north came to stay over night on his way to Bracebridge. His horse was put in the stable, without any fear of harm to Kitty. In the morning poor Kitty was found with her back broken, and had to be put out of her pain as quickly as possible. While she was with my friends, Kitty was a great source of pleasure, and instruction in animal life.

*Northern White-tailed Deer, *Odocoileus virginianus borealis* Miller.

A MIDDLE DEVONIAN FAUNA FROM NORDEGG, ALBERTA

By P. S. WARREN
Department of Geology, University of Alberta

THE Palæozoic outlier in the foothills at Nordegg, Alberta, 90 miles west of the town of Red Deer, is composed of Devonian and Carboniferous rocks. The geology of the region has been described by Allen and Rutherford[1]. Kindle[2] has described some Upper Devonian fossils from this region and Warren[3] has listed a Kinderhook fauna from the lower part of the Carboniferous succession.

Through the courtesy of the Research Council of Alberta the writer spent two days on this section during the summer of 1931 and was able to establish the presence of Middle Devonian beds in the succession. The fauna obtained at that time forms the subject of this paper.

The Palæozoic outlier at Nordegg assumes the form of anticline slightly overturned toward the east. The crest of the anticline is composed of Carboniferous (Rundle) limestone, the overlying incompetent Mesozoic rocks having been eroded off. Devonian beds (Minnewanka limestone) occur in the centre of the anticline with their base not exposed. It was in the lowermost Devonian beds exposed along the railway in Shuna gap and at least 2000 feet below the top of the formation that the fauna under review was obtained.

The fauna comprises three species only:

Productella hallana Walcott
Atrypa reticularis var. *a* Kindle
Martinia nevadensis Walcott.

The interest in this fauna is centred largely around the *Atrypa*. This variety was first mentioned by Whiteaves[4] in collections from the Middle Devonian of Manitoba from a horizon since recognized as the Elm Point limestone of Tyrell[5] by Kindle[6] who gave the form varietal distinction and demonstrated its significance as a zone fossil occurring below the *Stringocephalus* zone in the Manitoba section. Its occurrence at Great Slave Lake is very similar. It is very abundant in the Pine Point limestone lying immediately below the Presqu'ile dolomite which contains *Stringocephalus*[7]. The occurence of this peculiar form of *Atrypa* in these two widely separated areas and bearing in both cases the same relationship to the *Stringocephalus* zone seems to lend great value to the variety as a zone fossil. The writer wishes to press its claims in this respect and to suggest that the limestone beds containing this fossil in Shunda gap at Nordegg should be correlated with the Pine Point limestone of Great Slave Lake and the Elm Point limestone of Manitoba.

The two species found in association with *A. reticularis* var. *a* at Nordegg seem to be of little assistance in substantiating the correlation suggested. *Productella hallana* was the name proposed by Walcott[8] for specimens from the Eureka district which he considered identical with *P. dissimilis* Hall from Iowa[9] which name had been preoccupied. According to Walcott the species occurs at two horizons in the Eureka Devoninn. The Fentons[10] do not agree with Walcott's assignment, preferring to keep the Iowa species separate from the Eureka form and propose the name *P. walcotti* for the original *P. dissimilis* of Hall. The writer has examined specimens of a *Productella* from the Pine Point limestone of Great Slave Lake which appear to be examples of *Productella hallana* in its restricted sense. The identification is not positive for reason of the lack of comparative material. It is fairly certain however that the Great Slave Lake species is the same one that occurs with *A. reticularis* var. *a.* at Nordegg. It thus lends further evidence for the correlation of the *Atrypa* horizon at Nordegg with the Pine Point limestone at Great Slave Lake. We must consider, however, that the stratigraphic range of *P. hallana* is not known.

The last of the three species in our collection is a little more perplexing in regard to its stratigraphic significance. *Martinia nevadensis* was described by Walcott[11] as a variety of *Spirifer* (*Martinia*) *glabra* Martin from the upper part of the Devonian from two localities in the Eureka district. If Walcott means that the species occurs in the Upper Devonian then its presence in the *Atrypa* horizon at Nordegg would be quite contradictory to the other evidence. Unfortunately Walcott's stratigraphic references do not seem convincing. This species would look much more at home in a western Middle Devonian than in our Upper Devonian fauna. Meek[12] lists four species of *Martinia* from Great Slave Lake from

[1] Research Council of Alberta, Report No. 9, 1924.
[2] Pan-American Geologist. 42:218, 1924.
[3] Am. Jour. Sci., 5th ser., 10:448, 1925.
[4] Geol. Surv., Can., Cont. to Can. Pal., Vol. 1, Pt. 4, p. 289, pl. 37, fig. 8, 1892.
[5] Geol. Surv., Can., Ann. Rept. for 1889-90-91. Pt. E. 1893.
[6] Geol. Surv., Can., Sum. Rept. for 1912, pp. 251-253, 1914.
[7] Cameron, A. E., Geol. Surv., Can., Sum. Rept. for 1921, Pt. B. 1922.
[8] U.S. Geol. Surv., Mon. 8. 1884.
[9] Geol. of Iowa, Vol. 1, pt. 2, p. 497, pl, 3, fig. 7, 1858.
[10] University of Michigan Publications, Vol. 1, pp. 119-121, 1924.
[11] Loc.cit., p. 139.
[12] Chicago Academy of Sciences, Vol. 1, Art. 3, 1868.

a horizon now known to be the Pine Point limestone. Walcott's species is quite similar to Meek's *M. franklini*, the resemblance being almost sufficient to argue for a Middle Devonian age for Walcott's species. The position of the species in our section, over 2000 feet below the top of the Devonian is further evidence that we are dealing with a Middle Devonian form.

In spite of the seeming contradictory evidence provided by the presence of *M. nevadensis* in our fauna the writer believes that the *A. reticularis* var. *a* zone at Nordegg should be correlated with the Pine Point limestone of Great Slave Lake and the Elm Point limestone of Manitoba.

NOTES ON THE DISTRIBUTION OF SALMO SALAR AND SALVELINUS ALPINUS IN NORTHEASTERN CANADA

By J. R. DYMOND

The following information except where otherwise stated was supplied me by Captain John Hearn, C.G.S. Mikula, Quebec, who has had long experience on the Gulf of St. Lawrence, and has sailed a number of times to the Hudson Bay area. From my discussions with Captain Hearn I am convinced that he properly distinguishes the fishes mentioned.

Salmo salar—ATLANTIC SALMON. Captain Hearn reports that salmon occur in the following rivers of Ungava bay:—Koksoak, Chimo, St. George's and Leaf. Considerable numbers are caught and salted in some years at the Hudson's Bay posts on these rivers. According to Captain Hearn's information salmon are not found west of Cape Hope's Advance.

Salvelinus alpinus—ARCTIC CHAR.—This fish is very generally called sea trout on the north shore of the Gulf of St. Lawrence and along the Labrador coast, to distinguish it from the speckled trout. The latter, of course, runs into salt water, and when taken there is also called sea trout in many sections of eastern Canada. At Matamek on the north shore of the Gulf of St. Lawrence where *fontinalis* and *alpinus* both occur, the former is recognized as the speckled trout and the latter as sea trout. In Hudson Bay and along the north coast of Canada westward, Arctic Char is commonly called salmon.

The Arctic Char occurs in the Gulf of St. Lawrence at least as far west as Trinity River, according to the late Mr. C. N. Candee who has taken specimens in that region. From here they range along the north shore of the gulf to the Labrador coast and northward. Captain Hearn has seen the species taken as far north as Resolution Island. He has also seen it in McClure Strait and at Port Burwell. Small sea trout have also been taken at Big Island and in Wakeham Bay. These trout are said to be found only in the vicinity of rivers which flow from lakes.

THE SIGNIFICANCE OF THE PHYSIOGRAPHY OF THE CYPRESS HILLS

By C. H. CRICKMAY

IN recent years four * interesting works have touched upon the physiography of the Cypress Hills. Strangely, none of these have noted that the shapes of these hills are quite at variance with the form which our accepted theory of denudation tells us we must expect. This brief article is written to call attention to these circumstances.

The Cypress Hills lie partly in southeastern Alberta, partly in southwestern Saskatchewan. They are eighty miles long in an east-west direction, and about twenty in width. They stand 4800 feet above sea-level, or 1600 feet above the plains, at the west end; and 3500 feet, or 700 above the plains, at the east end. They are flat topped, with much-dissected sides of very variable steepness. Viewed from a distance the plateau character is lost, and they resemble a rounded swell in the plains, though I think few plainsmen would join Williams in calling them a "gentle" swell.

The flat top of the hills is underlain everywhere by the Cypress Hills conglomerate, 500 feet thick. For this reason, Alden concluded that the plateau was a surface of deposition. And, since the conglomerate is of Oligocene age, he concluded that the surface was of that age also.

Williams and Dyer, with more thorough and

W. C. ALDEN: Physiographic development of the northern Great Plains. Geol. Soc. America Bull. 35, 1924.
A. C. LAWSON: The Cypress Plain. Univ. of Calif. Publ., Geol. 15, 1925.
M. Y. WILLIAMS: The Physiography of the southwestern Plains of Canada. Trans. Roy. Soc. Canada (3) 23, 1929.
M. Y. WILLIAMS and W. S. DYER: Geology of Southern Alberta and Southwestern Saskatchewan. Mem. 163, Geol. Surv. Canada, 1930.

minute observation, showed that the plateau surface was an erosional one. My own observation suggests the following evidence of erosional origin. The conglomerate is not everywhere of the same thickness, and hence seems to have had its original thickness cut away in places. The actual flat upland is not perfectly flat, but is trenched by the narrow, shallow valleys of an extinct drainage system, the original limits of which undoubtedly lay far beyond the present limits of the hills. These valleys may now be traced to the broken edges of the plateau. Here it becomes at once evident that they are mere vestiges of a system of regional proportions, just as the upland on which they lie is a vestige of a former region-wide plain.

The shallow upland valleys, their winding walls, their floors, and their empty river channels are exquisitely preserved. It must be concluded that these features have not long been exposed to destructive agents. It is quite gratuitous to say that the conglomerate is of very hard materials, and is porous and hence permits leakage of the waters which might erode it. No rock is more than relatively resistant, and moreover, this conglomerate is readily wasted in those places where it is suitably exposed to agents of wasting. Further, erosion has plainly had chief place in former times in shaping the upland surface. It is, therefore, not possible to argue that the conglomerate capping is extraordinarily resistant. The conclusion follows that since its features reached their present stage of development the plateau has not long been exposed to erosion. It is not old. It may antedate the Pleistocene, but is probably not much older.

Now consider the present relation of the plateau to the plains which surround it. The plains lie, on the average, 1000 feet lower. No one doubts that the Great Plains are of erosional origin. Plainly they have been cut down to their present surface, and bevelled to approximate flatness. They have been modified by Pleistocene ice-sheets and by shifting, glacial streams. Finally they have been trenched to depths of 100 to 500 feet by recent rivers. The flat surface of the Cypress Hills represents the completion of one cycle of erosion. The cutting down and bevelling of the plains represents a second cycle. The recent dissection of the plains marks the beginning of a third.

Here, then, is the anomaly. How has the Cypress Hills upland survived the vast erosion that has occurred on all sides? Our accepted theory of denudation is that erosion is accomplished by two main sorts of action: rivers cutting down their channels, and weathering and rainwash reducing the interfluves. Downcutting is supposed to slow up as erosion advances, so that at the end, all parts become reduced to an even, low level without relief. The final approach to this stage is supposed to be so slow, and hence to require so long for its consummation, that no feature of a previous cycle could possibly survive it. Yet there stand the Cypress Hills, an eloquent denial of all this denudational theory.

It would seem that the theory requires modification in some respects. In the first place, it seems likely, from this Cypress Hills example, that erosion may reach completion in one limited area in a comparatively short time, and that it may run to completion in one part of an area before it even starts in another. This can only mean that the erosion of interfluve areas is not accomplished by any such universal process as wasting which, if effective at all, must be effective in every place exposed to weathering and rainfall. The erosion of interfluves seems to be accomplished by an agent of limited scope, yet of unquestionable power and unfailing efficiency. What is this agent?

A good lesson may be learned by observing the present distribution of active erosion on the plains—it is confined to the immediate vicinity of drainage lines. It is suggested that the solution of the erosion problem lies in a better appreciation of this fact of erosion being confined to drainage lines, and in a clearer discernment of the parts played by the three kinds of stream erosion—downcutting, headward cutting, and lateral cutting. No comparative study has ever been made of these factors. Indeed, it is only in recent years that lateral erosion has come to be appreciated as a dominant process. In any case, I hope to supply bit by bit, as the evidence of a sufficient number of examples can be analyzed and published, the answer to the questions I have raised.

NOTES ON THE HABITS OF THE PORCUPINE*

By ALFRED KAY

IN THE winter, porcupines feed on the tips of the limbs and bark of trees that grow near the dens in which they sleep and have their young. These dens are usually in clefts in rocky hills, but sometimes in hollow logs. On stormy days they stay in their dens, but on ordinary fine days they go to the tree that they have picked on for their chief supply of food, keeping to much the same track each time until they soon have a well-beaten path made. The trees they like best are the maple, birch, hemlock and cedar. After they have fed on a tree all winter, it is generally so badly girdled that it dies or is greatly stunted. Where there is a colony of porcupines the amount of timber they destroy is very considerable. During the spring and summer months they feed on a large variety of succulent plants. At that time they seem to prefer to travel and feed in the cool of the night, and among their favourite haunts are the marshy, shallow bays of lakes and rivers, where they scramble about in the warm water feeding on the water lilies, tender grasses, and other aquatic plants.

From my own observations I don't think that they are confined to any particular time for breeding. My son, J. R. Kay, found a female in a hollow pine log in the middle of February with a young one about a month or six weeks old. I have found young early in May and also early in June. I once killed a female as it was crossing my field early in June with five young ones following her. I have also killed young ones quite late in the summer and early fall, some were fairly small while others were nearly full-grown.

The adult males will fight vigorously at times, and give the fiercest yells, equal to those of any wild cat. I once killed a pair of males that were fighting. I was attracted to them by their yelling, and they had torn one another so badly that I don't think either of them would have lived. One had its bowels hanging out, and the other one was slashed to the bone on the neck and shoulder and was bleeding freely. From specimens of female porcupines that I have dissected, and from young that I have seen following their mother, I think they have from one to five in a litter.

Porcupines seem to be greatly infested with internal parasites, such as tape worms, hook worms and the common round worms; sometimes all three kinds are found in the one animal, and in great numbers. This is, no doubt, one of nature's ways of keeping their numbers in check. Foxes will kill them and so will the great horned owl. I have had specimens sent me just stuck full of quills inside and out.

If porcupines are taken when young they are easily tamed, and are very affectionate and sagacious. They are built for climbing. The hind feet are turned sideways; their limbs are strong and muscular; their feet are flat with strong, long claws; their hind feet are well fitted to grip the rounded surface of the trees while their front feet are reaching up to grasp anything to draw themselves up, and they can support the whole weight of their bodies by pressing their broad, heavily-muscled tail, with its dense growth of short, strong quills, against the trunk of the tree. In climbing they can travel quicker than they can on the ground. Their front teeth are very much like those of the beaver, made for cutting wood, barking trees, and so on.

They are very destructive to summer cottages and out-buildings, chewing the doors, windows and floors to pieces; often completely destroying them. They are very fond of salt, and will chew any wood on which they can get any taste of salt. The one that I raised, on account of having free access to all the salt that he needed, never chewed the wood about our house. He chewed a hole in the barn door, but that was to get in so that he could help himself to clover, hay and oats in the winter time. He made a sleeping den under the gangway at the barn door.

When properly prepared and cooked the flesh of the porcupine is very nice, having a smell while cooking that would make anyone hungry.

*Eastern Porcupine, *Erethizon dorsatum dorsatum* (Linnaeus).

A FEW RECORDS OF MAMMALS FROM MANITOBA

By STUART CRIDDLE, Treesbank, Manitoba

ONE OF the pleasures in the life of a field naturalist is the knowledge that a year seldom passes without providing something new, or supplying a record of outstanding interest. Here at Aweme 1931 commenced well and it finally proved to be considerably above the average in furnishing local records of unusual interest.

On the sixth of January I secured the smallest adult mammal I have ever captured, this was a male *Microsorex h. hoyi* (Baird) which was caught by hand while running on the snow in a poplar bush. It was placed in a leather mitt with the hope of getting it home alive but it died almost immediately. Its measurements are: Total length, 78.8 mm; tail vertebrae, 27.4 mm.; hind foot, 9.9 mm.; ear 3.0 mm.; weight, 1.79 grams. Truly a midget among small mammals.

A few weeks later I obtained a second record. Captain K. P. Darnell of South Junction, Manitoba, had very kindly undertaken to do some trapping for me and in a box wheich he sent containing a few mice, were 21 small shrews, six of which proved to be *Microsorex*. These were all mature although possibly the result of a single litter. Unfortunately the warm weather caused their hair to slip rather badly, consequently I was unable to make all of them into museum specimens. Their measurements, with two others from Captain Darnell, are as follows:

	Total length	*Tail vertebræ*	*Hind foot*	*Ear*	*Weight*
♀	87.7 mm.	31.2 mm.	10.1 mm.	2.5 mm.	2.75 gr.
♂	91.4 mm.	39.2 mm.	11.0 mm.	2.8 mm.	2.49 gr.
♂	91.5 mm.	31.7 mm.	10.4 mm.	..	2.62 gr.
♀	88.2 mm.	29.0 mm.	11.1 mm.	2.7 mm.	2.62 gr.
?	84.7 mm.	29.7 mm.	11.4 mm.	3.2 mm.	2.62 gr.
?	82.4 mm.	29.2 mm.	9.9 mm.	2.9 mm.	2.04 gr
?	83.4 mm.	29.8 mm.	9.8 mm.	2.7 mm.	2.82 gr.
?	83.4 mm.	29.8 mm.	11.2 mm.	..	1.94 gr.

I cannot definitely say whether these are true *Microsorex h. hoyi* or not. They are decidedly darker than the specimens named for me from Aweme.

On April 23 Mr. R. M. White gave me a Silver-haired Bat, *Lasionycteris noctivagans* (Le Conte), which he found in an old building. The weather was quite cold at the time and the bat was in a semi-dormant state when first picked up. It had probably arrived during a warm spell some six or eight days before. This constituted our earliest record of a bat being found at Aweme.

Early in May a fine Woodchuck *Marmota monax canadensis* (Erxl.) was seen in our woods, the first for many years. Then on the twelfth of August, Mr. Oliver Rolfe gave me a beautiful black specimen which he had caught on his grain fields east of Treesbank. Marmots have always been rare in our part of the world, why this should be is unknown because there is abundance of food and much suitable country available. Mr. Rolfe's specimen, a male, is, I think, the first black one to be recorded for the province. It was somewhat below normal size and measures as follows: Total length, 591 mm.; tail vertebrae, 166 mm.; hind foot, 85.5 mm.; ear, 21.5 mm.; weight, 4 pounds, 9 ounces.

My last, and most interesting record, was brought about in the following manner: Towards the end of July my brother Norman received a communication from Mr. J. R. McPherson of Souris in which complaint was made of a number of small bats infesting his house. The information was handed to me and I immediately wrote to Mr. McPherson asking him to send me some specimens for identification. On August 7 two arrived one of which was still living, the other had been killed and its skull was rather badly crushed. I noticed at once that these animals had longer ears than any we had taken at Aweme. The ears when bent forward extended well beyond the muzzle, this and their colour corresponded so well with old descriptions of the Say bat that I mistook them for *Myotis s. subulatus* (Say). However, Dr. R. M. Anderson, Chief of the Division of Biology, National Museum of Canada, Ottawa, doubted the correctness of this determination and when they were submitted to him for inspection he found them to be *Myotis keenii septentrionalis* (Trouessart), or, as he aptly calls them, Trouessart Brown Bat. No previous record of this bat's having been taken in the province can be found, thus it would seem that we have added one more mammal to those known to occur in Manitoba.

The measurements and weights of these two bats are given below:

Total length	*Tail vertebræ*	*Foot*	*Ear*	*Wing span*	*Weight*
89.7 mm.	40.5 mm.	11.9 mm.	15.8 mm.	256.4 mm.	7.09 gr.
99.5 mm.	46.5 mm.	11.3 mm.	15.3 mm.	259.5 mm.	6.56 gr.

The explanation for there being no previous records of these bats occurring in Manitoba may be that they only get as far west when weather conditions are similar to those which we had during the early summer, namely extremely dry with an unusual number of hot and very strong winds from the south and west.

NOTICES OF MOTION

Mr. President:

I wish to give notice that, at the next Annual Meeting of this Club, I propose to move that the Constitution of this Club be amended by the insertion therein of the following clauses:

Life Members of the Club shall be those persons or institutions from each of which the Club shall accept the sum of seventy-five dollars in one payment for a life membership. Life Members shall be entitled to all the rights and privileges of membership in the Club, including receipt of the publications of the Club, for the rest of their natural lives, if persons, or of their continuous existence, if institutions, without any further payment being required of them.

The Club shall establish and maintain a permanent fund to be known as the Publication Fund as soon as any money for such a fund shall be received. All dues for life memberships, all bequests not directed by the donor to be used otherwise, all gifts specifically intended for this fund, and fifty per cent of the annual interest received from the investment of this fund shall be paid into and included in this fund as soon as possible after their receipt. The remaining fifty per cent of the annual interest received from the investment of this fund shall be available for use in publishing, or assisting to publish, *The Canadian Field-Naturalist* or other publications of the Club, as Council may from time to time direct.

A separate audited financial report on this fund shall be presented by the Treasurer at each annual meeting of the Club.—HOYES LLOYD.

MR. PRESIDENT:

I wish to give notice that at the next Annual Meeting of this Club, I propose to move that the Constitution of the Club be amended by the deletion of Article III. (Membership) and the substitution of the following:

ARTICLE III.—MEMBERSHIP.

(a) *Active:* Anyone interested in Natural History may upon application be elected by Council as an active member of the Club. Payment of the annual fee shall be a necessary condition of the continuance of membership.

(b) *Corresponding:* Any eminent naturalist not resident in the Ottawa District, who is desirous of promoting the objects of the Club, may be elected by the Council as a Corresponding Member.

(c) *Life Members:* Upon payment of the sum of fifty dollars in one payment, any active member or institution may become a Life Member.

(d) *Sustaining Life Members:* shall be those persons or institutions from each of which the Club shall accept the sum of one hundred dollars ($100.00) in one payment for such membership.

(e) *Benefactors:* shall be those persons or institutions from each of which the Club shall accept the sum of five hundred dollars or more.

(f) *Honorary Members:* Any prominent person resident of the Ottawa District, who shall to a marked degree assist towards the successful working of the Club, may be elected by the Council as an Honorary Member. There shall not be at any one time more than five such Honorary Members.

(g) *Patrons:* the Council shall also have power to elect a Patron or Patrons after his (or their) consent has been obtained. The Patrons shall be considered Honorary Members.

(h) No Membership fee shall be expected from Corresponding or Honorary Members.

(i) *Privileges of Members:* Benefactors, Sustaining Life Members and Life Members shall be entitled to receive the publications of the Club for the rest of their natural lives if persons, or of their continuous evistence if institutions, without any further payment being required of them.

PUBLICATION FUND.

The Club shall establish and maintain a permanent fund to be known as the Publication Fund, as soon as any money for such a fund be received. All dues for Benefactorships, Sustaining Life Memberships, Life Memberships, all bequests not directed by the donor to be used otherwise and all gifts specifically intended for this fund shall be paid into and included in this fund as soon as possible after their receipt.

The annual interest received from the investment of this fund shall be available for use in publishing or assisting to publish "The Canadian Field-Naturalist" or other publications of the Club, as Council may from time to time direct.

A separate audited financial report on this fund shall be presented by the Treasurer at each annual meeting of the Club.—A. LA ROCQUE.

NOTES AND OBSERVATIONS

Microsorex hoyi hoyi AT TORONTO, ONTARIO.—Three additional specimens of this species have been taken by me at Mount Dennis, close to Toronto, all under the same stump in a wet area. The first, a male, was trapped on April 17, the second, a female, on April 19 and the third, also a female, on April 21, all 1931. One of these, a female, is now in the mammal collection in the gallery of the Royal Ontario Museum of Zoology and the other two are in my collection.

The measurements, in millimeters, as taken from the animals in the flesh, are as follows:—Length, 87 mm.; tail, 30 mm.; hind foot, 9.75 mm.; female: length, 97 mm.; tail, 33 mm.; hind foot, 10 mm.; female,: length, 87 mm.; tail, 29 mm.; hind foot, 8.5 mm.

My first specimen, a male, was secured by me at Cedarvale, near Mount Dennis in Toronto, on April 20, 1929, record of which has already appeared in these columns. It measured: length, 87 mm.; tail, 31 mm.; hind foot, 10.5 mm.; and is in my collection.

These are the only records of the Pigmy Shrew in the Toronto region.—CLIFFORD E. HOPE.

BLACK-CROWNED NIGHT HERON IN OKANAGAN VALLEY, B.C.—On September 18, 1927, I collected a specimen of the Black-crowned Night Heron, *Nycticorax nycticorax hoactli*, in immature plumage. It was submitted to Major Allan Brooks for inspection. The only other record for this province is a sight record by Allan Brooks a number of years ago in this valley.

The bird was noted two days previous to the date when I took it. I was out hunting ducks when it rose from the marsh in front of me and slowly flapped against a strong wind, thus giving me an excellent chance to note its characteristic markings. When taken it was in some large trees at the mouth of the creek. On October 2nd of the same season I was surprised to note another of these birds at the mouth of the same creek I secured the first bird at. It rose from the sandy shore and flapped slowly out over the lake. These are the only records I have of this Heron here.—ERIC M. TAIT.

WHITE PELICAN ON VANCOUVER ISLAND.—The appearance of the White Pelican (*Pelecanus erythrorhynchos*) in 1930 on Vancouver Island would seem worthy of record. On June 17th, Deputy Game Warden J. C. Smith, of Comox, brought me a specimen of this bird. The latter had been shot by some unknown person at Deep Bay, about fifteen miles south of Comox. Acting on information that such a bird had been killed, Wardens B. Harvey and J. C. Smith investigated and, after a search, secured it. The head had been cut off, and the remains buried but luckily the bird was still fairly fresh when the Wardens dug it up, and after laundering the skin in a tub of suds and sewing on the head, I was able to make quite a good specimen.

The bird was said to be one of a small flock of five, and though exceedingly poor was in breeding condition sexually. The weight was sixteen pounds. The wing-spread covered eighty-nine inches and the wing molt was interesting in that the first primary in each wing was old and faded. Unfortunately the horn on the bill had been broken badly in the rough usage. The soft parts were strikingly rich in colour: the toes and tarsus, orange; bill, dull orange; pouch and bare area about eye, chrome yellow; iris, straw yellow.

The breeding ground of the White Pelican in British Columbia lies in the northern interior and he avoids the coast. On October 6th, 1928, I observed a flock of pelicans in southward migration at Ashnola Creek, Southern Similkameen, and on May 26th, 1929, a flock of thirty winging up the Okanagan Valley at Osoyoos Lake, both flocks evidently going to or from their summer home in the Chilcotin or Cariboo country.—HAMILTON M. LAING.

SPRING RECORDS OF PECTORAL SANDPIPERS AT LONDON, ONTARIO.—This bird, though very regular and common in the autumn flight, has been so rare in spring in the past, that any occurrence whatever in that season has been noteworthy, but the spring of 1931 has certainly been a conspicuous exception. Beginning on April 10 when 30 were seen by Mrs. E. H. McKone, flying over "The Pond" they were seen almost daily by all the working members of the McIlwraith Ornithological Club, and when they were missed for a day, the reason did not lie with the Sandpipers, but with the observers. On April 13th, 5 were seen about 2 miles farther south, and on the 19th, 35 were at the same place. Continuing through the month, 25 were seen on the 20th, 35 on the 25th, 40 on the 26th, 50 on the 30th, culminating in 125 on May 3rd. The last were seen on May 10th, when 30 were found at the same place as the 125 on the 3rd. Reports came in from West Lorne, where Mr. Earl Lemon saw very many through the same period, estimating 200 as the largest number seen in one day, and

*The Canadian Field-Naturalist, 43: 168, Oct., 1929.

T. D. Patterson estimated 200 seen in a drive to Mitchell, about 45 miles northeast. A letter to Mr. J. H. Fleming elicited the information that none had been seen near Toronto up to that date and on calling the Museum, he was informed that they had only a small scattering of spring records, and *no specimens;* but Mr. Fleming kindly added "You may be right". When Mr. Stuart Thompson was at London, we took him out on May 10th, and he saw the very last flock of 30.

The habits of these birds appeared to us to be somewhat unusual. While they were very often found *in wet places*, and *always* near puddles, there were usually some of them, and sometimes all, on the nearby higher ground, busily picking up insects. When a car approached close enough the whole company would cease activity and eye the intruders with mild suspicion, but soon, that gentle feeling was allayed and feeding would proceed vigorously, and then, by a slow approach the observer could come within 15 yards of the nearest birds. On the ground they were always quiet but the usual *"prrt"* was given freely when they took flight. Farmers noted these unusual birds at the pools in their fields and near the barnyards and reported them. Almost, if not quite, every favourable pool that we visited contained Pectorals at some time or other during this flight, and of course, they ceased altogether to be worthy of special note.

In the autumn, as already stated, these birds are confidently looked for, but their appearance on the first occasion this fall was nearly as great a surprise as their numbers in the spring; for they were seen on an evening examination of the golf links where there had been reported a bird which was suspected to be a Golden Plover. Local records of this plover being so excessively rare, an immediate visit was paid to the club grounds, and the dominating bird was found to be the Killdeer, of which perhaps 40 were seen. But, as we walked across the greens, our attention was taken by a loose flock of waders feeding on the dry, close-cropped grass, far from any water, and these, on investigation, were found to be Pectorals, to the number of 18. After watching them for some time, they were flushed, and they flew out of sight. Evidently there is now a need for all good golfers to carry a field glass.—W. E. SAUNDERS.

HAWK MIGRATION IN ESSEX COUNTY, ONTARIO.—Across the thirty-mile-wide peninsula of Essex County each September and October occurs a migration of hawks in incredible numbers. I have observed this flight each fall but never in the thirty-four years of my life have I seen such numbers as I witnessed on the morning of September 19th, 1931. The number of hawks present could scarcely be made believable to one who had not seen them. Some witnesses thought there were as many as fifty thousand present. Circling flocks could be seen with the naked eye for two miles in any direction and with glasses more were visible at a greater distance. By counting the number in a single flock I estimated that between ten and twenty thousand hawks were passing within sight.

High in the air, Broad-wing, Red-shouldered and Red-tailed Hawks circled, sailed four or five miles and circled again. To my surprise, lower down an occasional Osprey or Fish Hawk passed not circling like the others but flying much faster and not mixing with them. Near to the ground were many Sharp-shinned and Cooper's Hawks with occasional Sparrow and Pigeon Hawks.

I have seen as many hawks in a whole day but never before such numbers in less than an hour as on this occasion. It was between eight and nine o'clock in the morning and I conclude that the birds probably congregated for the previous night in some near-by woods and were starting out together on their day's travel. They were progressing at varying speeds and by night would very likely be spread out for fifty or a hundred miles.

All with whom I have talked agree that they had never seen such a migration before but a similar one differing only in the degree of concentration occurs here each fall. All bird lovers especially those who believe that hawks are nearing extinction should make a special trip to Point Pelee and the Lake Erie shore towards Kingsville during the last fifteen days of September any year and witness for themselves this great annual flight of hawks that I have seen every year of my life.—MANLY MINER.

BIRD NOTES FROM THE VICINITY OF CASTOR, ALBERTA.—BLACKED BILLED CUCKOO. (*Coccyzus erythropthalmus*).—I first saw this bird on June 12, 1922—three birds together. A nest containing one egg was found on July 5th, the nest being three feet from the ground in a Saskatoon-berry bush and built of twigs and the fluffy seed pods of the Willow. Another nest was found on July 17th, containing three eggs, seven feet high in a Willow.

I found the species fairly common, there being at least six pairs in an area of two square miles. As most of the Poplar bluffs in the neighbourhood were situated in this area, that is no doubt the reason why the Cuckoo appeared to be common.

As a matter of fact, I only met with the bird at one other place in the Castor district although I saw a pair of birds in 1927 a few miles northeast of Forestburg, about sixty miles north of Castor.

In 1923, 1924 and 1925 I found from two to five nests each year. All were placed from three to seven feet from the ground in Willow or Saskatoon-berry bushes.

The Cuckoo does not reach Alberta before the second week of June and nesting does not commence before the beginning of July.

LARK BUNTING (*Calamospiza melanocorys*).—I first met with this bird in the Castor district in the Spring of 1920 when I collected a male. Several more were seen at intervals up to June, 1923. On June 18th of that year I discovered a breeding colony of twelve pairs on the open prairie and a second colony of eight pairs about three miles from the first. Although unable to find eggs I later on found several nests containing young birds. The birds did not return to the place the following year and it is the only breeding record I have for Alberta.

LAZULI BUNTING (*Passerina amoena*).—I collected a male of this species thirteen miles southwest of Castor, Alberta, on May 26th, 1924. It was feeding on seeds of Lamb's Quarters. The bird was given to Prof. Rowan and I believe he still has it in his collection.

PINE WARBLER (*Dendroica vigorsi*).—On June 5th, 1924, Prof. Rowan collected a male of this species on my farm, thirteen miles southwest of Castor. The bird was singing at the time it was shot. In 1928, at Boyle, Alberta, about 100 miles north of Edmonton, I heard and saw several Warblers whcih I could not identify. Their song seemed familiar but they were very shy and even with glasses it was difficult to obtain a clear view of the birds. They appeared partial to isolated small clearings of large Spruce trees. After watching them on several occasions I decided they were Pine Warblers. Early in July Mr. H. Oberholtzer of Washington, was staying with me and I drew his attention to the singing of one of these birds. Without any hesitation he said "Pine Warblers" and further observation confirmed this.—T. E. RANDALL.

NESTING OF SANDHILL CRANE.—Though it has been generally taken for granted that the Sandhill Crane nested on Vancouver Island swamps in earlier days, yet there seems no concrete evidence from the past and not even the earliest settlers I have questioned had anything definite to offer till three or four years ago John Pritchard, of Comox, B.C., told of his father finding young cranes at Quinsam Lake in early days, which might mean thirty-five years ago. In 1929 my informant advised further that while he was employed in the logging camp he had seen two cranes behaving in a suspicious manner and the fact that they remained here at all in summer indicated a breeding ground. He promised to watch closely and report in 1930 and on June 6th brought word that the crane's nest had been found by James Thompson the watchman whose camp was on the logging railway six or seven miles above Camp Three.

Owing to very rainy weather I was unable to see the nest till June 15th when Thompson led me to his find in a swamp half a mile from the right of way. Most of the timber had been cleared from the surrounding region though the machinery was still in noisy operation within half a mile. Thompson explained that he had stumbled upon the sitting bird quite by accident while crossing the marsh and she had held so close to her eggs as to brush his legs with her wings in her sudden take-off. Both nest and bird were very completely hidden in a quite dense stand of waist-high shrubbery (Sweet Gale) and the eggs could be seen only at a distance of a few feet. The swamp was half dry.

On our approach the sitting bird, presumed to be the female, flushed at about twenty feet and in response to her calling, the mate came trumpeting from a neighbouring swamp half a mile distant, upon which both birds dropped down out of sight and kept calling anxiously. There were two eggs on the matting of sticks from the material at hand, though Thompson said he was quite certain a pair in the vicinity the previous year raised three young. I photographed the eggs—finding it necessary to remove some of the shrubbery screen—and left.

As I hoped to secure a photograph of the crane on the nest, I returned on June 24th. After flushing the bird again, I spent a few minutes clearing a lane through the shrubbery, then set up the tripod at a distance of about twenty feet and hurried away. I hoped the tripod would pave the way for the blind to be put up later. But heavy rain came on and when I returned about six hours later, in mid-afternoon, there was no sign of the birds and the eggs were wet and cold. The bird's natural timidity, the tripod, the weather in combination proved too much. She refused to return and so next day I took the eggs, which now are in the National Museum, Ottawa.

As this nesting ground is but three or four miles from the Quinsam Lake where young cranes were found by Pritchard, it is more than possible that these swamps have been a breeding ground through the years.—HAMILTON M. LAING.

BOOK REVIEWS

A NEW BOOK ON FISHES.—An important event to those interested in any way in the study of fishes is the publication of "A History of Fishes," by J. R. Norman. (Ernest Benn Ltd., London, 1931, 28s.). Mr. Norman is in charge of the fish collection of the British Museum (Natural History). The results of the latest advances in almost every phase of ichthyological and fisheries research are included in the discussion of the various aspects of fish life, such as form, locomotion, respiration, fins, scales, venom, electricity, light, sound, nervous system, colouration, conditions of life, distribution, migration, breeding, courtship, parental care, development, classification, taxonomy, etc. The relation of fishes to man is discussed under such headings as fisheries, fishing methods, fishery research and even fish mythology. The matter is presented in language intellible to the average educated layman. The book is an important contribution to ichthyology and no doubt will prove indispensable to those engaged in any branch of that science.

COMMON PESTS. *How to Control some of the Pests that Affect Man's Health, Happiness and Welfare. By Rennie W. Doane. Charles C. Thomas, Publisher, Springfield and Baltimore, 1931.*

The book before us is one of a series of "Nature Books" edited by Dr. Hartley H. T. Jackson. It includes within its 384 pages descriptions of a multitude of creatures beginning with scorpions and ending with mammals and birds. The work is divided into two sections, the first entitled: Pests of Man and Domestic Animals; the second: Insect Control and Some Important Pests of the Orchard, Garden, Field and Household. Under section One we find the following chapter headings: 1. Some near Relations of Insects; II. Blood-sucking Flies; III. Mosquitoes and their Control; IV. Mosquitoes and Disease; V. Flesh-flies, Screw Worm Flies and Bot Flies; VI. House Flies and Disease; VII. Bedbugs, Lice and Fleas; VIII. Parasitic Worms.

Section Two contains: IX. Control of Insect Pests; X. Insect Pests of the Orchard; XI. Citrus Pests; XII. Insect Pests of Berries; XIII. Insect Pests of Grapes; XIV. Insect Pests of Field Crops; XVI. Insect Pests of Shade and Forest Trees and Lumber; XVII. Flower Garden Pests; XVIII. Greenhouse Pests; XIX. Insects Infesting Mills, Store rooms and Houses; XX. Mammals as Pests; XXI. Birds as Pests.

The book is evidently intended as an elementary text book for the average individual who is not versed in the habits and control of the commoner pests with which he might be expected to come in contact. In this object it will serve a useful purpose and we feel, on the whole, that the author is to be commended on the results achieved.

It was to be expected, in a work of this scope, that there would be some regrettable omissions and that there might be disagreement as to the wisdom of the selections made. The first point which will strike a Canadian reader is that the author was either unfamiliar with the insect conditions north of the international boundary or that he intended the book for use only in the United States.

One of the most serious defects of the book is that it appears to have been compiled from sources which, in many instances, are out of date. We note for example that no mention is made of the part played by black flies in the transmission of a blood parasite of poultry, nor of nicotine sulphate for destroying biting lice. The recent great progress made in the use of pyrethrum powder for the control of fleas and many other insects is overlooked. Arsenate of lime, now one of the most widely used insect poisons, is scarcely recognized, and derris, now recommended for the destruction of warble flies, is not even mentioned. The recommendations for grasshopper control include the use of the long discarded "hopper dozer"; the description of the egg habitats is also misleading. Cutworms and armyworms are discussed together as if all had similar habits, which, of course, they have not, while the pale western cutworm, one of the principal scourges of grain crops in the Great Plains region, is not even mentioned, nor indeed is the wheat-stem sawfly or the bertha armyworm.

The chapters on mammals and birds are less open to criticism and they add not a little to the interest of the book. We have yet, however, to discover any evidence to support the oft repeated claim that weasels "suck blood" while the "lust to kill," so frequently credited to these and other predators, is in reality based on a desire to obtain food for future use which in a great majority of cases is actually stored away in much the same

manner as a squirrel stores nuts.

The book is well printed and the illustrations, on the whole, are good.—N.C.

ATTUNE WITH SPRING IN ACADIE *by Claire Harris MacIntosh, Introduction by F. Schyler Mathews. Illustrated by Marjorie Hugson Tozer. G. P. Putnam's Sons, New York; London, 1932. Quarto, pp. 106, 8 full page coloured plates and many small black and white crayon drawings. Price, $3.00.*

A book of child's verse reduced to child's mentality. It treats of some common Nova Scotian birds in humanistic manner but so does Mother Goose, and if it achieves a tithe of the success of that classic its future is assured. Most of the lines run with a merry jingle and their presentation of specific character is sympathetic to childhood ideals if not to those of science. Included are five bird songs (words and music), or rather songs about birds in which the natural songs are woven into the themes. At the back of the volume are several lists of the land birds of Nova Scotia grouped in various convenient ways. The volume is nicely got up with dainty cardboard case and bound in pale blue pictured boards. It makes an attractive gift book and may turn the thoughts of many youngsters birdways.—P.A.T.

A bulletin entitled "Water Fowl in Relation to the Spawning of Herring in British Columbia," the authors of which are J. A. Munro, Chief Federal Migratory Bird Officer for the Western Provinces; and W. A. Clemens, Director of the Pacific Biological Station, has been published under the auspices of the Biological Board of Canada.

The report comprises 12 sections. There is a short (1) Introduction, the joint production of the two authors, and the gist of the article purports to be an answer to its opening words which are these:—"There is an increasing tendency on the part of both commercial fishermen and anglers to attribute in some degree the depletion of the stocks of many food and game fishes to the activities of certain bird species."

The introduction is followed by a (2) Topographical sketch of the region of which the article treats, viz.:—Departure Bay and adjacent waters, and an outline of the (3) Life history of the Pacific herring (*Clupea pallasii*) by W. A. Clemens.

Subsequent to these, four sections are devoted to the question of to what extent aquatic birds prey upon the herring or its ova, by J. A. Munro. These are entitled, (4) Species of gulls concerned, (5) The capture of herring gulls, (6) The consumption of herring ova by gulls, and (9) Observations of other water fowl. Here the reviewer would say that this work presents itself to him as being very thoroughly done. Section nine reveals exceedingly close observation, portraying much of the general habits of these aquatic birds, and this beyond the question of to what extent they devour the ova of herring, while the account is very systematic and easy to read. Furthermore, stomach contents of numbers of species, viz.:—of a murrelet, a guillemot, a murre, and various cormorants and ducks, have been analyzed and are now published.

The remaining sections are by the two authors jointly, and are entitled: (7) Stomach contents of gulls collected at Departure Bay, B.C., which comprises a series of tables presenting, apparently, an exhaustive analysis of the contents: (8) Contents of gull pellets: (10) Destruction of herring ova by ducks, which contains a criticism of an article in *Trans. Roy. Can. Inst.* on *Clupea pallasii* by Dr. C. McLean Fraser: (11) Summary and conclusions: and (12) Acknowledgments.

The bulletin is illustrated with seven figures, viz.:—(1) Departure Bay area, which is a map of that bay and its vicinity: (2) Eggs of herring on seaweed: (3) Gulls on beach at Departure Bay: (4) Glaucous-winged Gulls near Nanoose Bay: (5) Regurgitated pellets of the Glaucous-winged Gull—natural size: (6) Regurgitated pellets of the same—one-third natural size: and (7) Surf Scoters in flight, Nanoose Bay.

The authors are to be commended on the production of this report. It reveals a thorough study and is admirably done. They present the data as they ascertained them to be through observation and their research work, yet they are careful in drawing conclusions and cautiously state:—"In such studies collaboration between ichthylogists and ornithologists is necessary in order that identifications may be authoritative and observations correctly interpreted." Still in a careful perusal of the report it may be discerned that in the judgment of the authors, man is the chief cause of the depletion of species; and in this judgment the reviewer concurs. Until the white man entered upon the scene there were far more birds of certain kinds, and also far more fishes of certain kinds, than there are to-day, so that unquestionably the depletion is attributable to man; for nature being no respecter of species, ever seeks, under natural competition, to maintain the balance among living creatures.—ANDREW HALKETT.

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THE CORRELATION OF SUNSPOT PERIODICITY WITH GRASSHOPPER FLUCTUATION IN MANITOBA

By NORMAN CRIDDLE

Dominion Entomological Laboratory, Treesbank, Manitoba

THE APPARENT correlation of sunspot periodicity with certain animal fluctuations was first brought to my attention by Dr. Ralph DeLury of the Dominion Observatory, Ottawa. The subject is by no means new but with the exception of Dr. DeLury few people in Canada have devoted much attention to the study.

The first attempt to correlate grasshopper cycles with those of sunspots seems to have been made by A. H. Swinton in England in an article entitled "Data obtained from Solar Physics and Earthquake Commotions Applied to Elucidate Locust Multiplication and Migration" (1878). In this article an attempt is made to correlate solar disturbances with locust prevalence both in Europe and America. The evidence is far from conclusive although it does suggest that periods of sunspot minima are most favourable to grasshopper outbreaks.

If, as has been claimed by Dr. DeLury, there are actually marked atmospheric changes due to sunspot cycles, it follows that these may have an important effect upon animal and plant life. Indeed the available evidence strongly indicates that this is so, both in the case of game animals and in trees. In the present paper I have attempted to show to what extent grasshoppers fall within the same sphere of influence.

In order to understand the causes of grasshopper fluctuation we should first know the maximum possibilities for reproduction in the species involved. This has been ascertained by study of the egg-laying capacity of those insects. We find that the average number of eggs under favourable conditions deposited in a year by *Melanoplus mexicanus* Sans., *M. femur-rubrum* De G., or *Camnula pellucida* Scud. to be approximately 150 per female, while *Melanoplus bivittatus* Say produces at least 200 eggs. The possibilities for reproduction under optimum conditions are thus seen to be very great, and the evidence leaves no doubt in our minds as to why grasshoppers rapidly increase when conditions are favourable.

As a rule grasshoppers are kept within bounds by a combination of meteorological factors and natural enemies. Should these conditions exert their maximum effect at the same time, then grasshoppers would become very scarce indeed, but generally the weather conditions which are detrimental to grasshoppers are also adverse to their insect foes; hence the two rarely act in unison. The meteorological factors, in particular, have a most important bearing on grasshopper survival and without favourable weather it is doubtful whether these insects would ever, in our territory, attain sufficient abundance to become an agricultural pest. This fact has long been recognized as the following quotation from the "Second Report of the United States Entomological Commission" (1878) will indicate:—"We may state, therefore, as a proposition which we presume will be admitted as correct, that the development and movements of locusts are very largely influenced by meteorological conditions."

The seasons which most favour the development of grasshoppers are those in which dryness is combined with heat and sunshine. The optimum conditions would probably be a late, comparatively dry autumn followed by an early, warm spring with a maximum of sunshine throughout the summer. Moisture, however, either in the form of green herbage, dew or rain, is essential to grasshopper survival and short, heavy thunderstorms, providing a maximum of precipitation without greatly interfering with the heat and sunshine, would provide an impetus to rapid development. Such conditions combined with a comparative absence of important natural enemies, would almost surely bring about a grasshopper outbreak from normal numbers within three years.

From the above it will be noted that grasshopper fluctuation is largely brought about by two factors, namely, weather and invertebrate

enemies. Both play an important role in the inception of an outbreak while the decline, in spite of favourable weather, may be due to natural enemies alone. As a rule favourable weather is most important at the beginning of a grasshopper outbreak while parasites and diseases do most to reduce it.

It is usually assumed that extreme dryness is favourable to grasshoppers but as a matter of fact this is not true. Not only do the eggs require a certain amount of moisture in autumn to survive but moist soil is also important to assist development and ensure a maximum hatching in spring. Moisture also becomes necessary after the hoppers hatch and without succulent food they would inevitably perish.

In attempting to reach a conclusion as to the possible correlation between the periodicity of sunspots and the fluctuation of grasshoppers I have availed myself of as many of the old references to grasshoppers as possible. These records are far from being complete and a majority of them appear to relate to invasions rather than to local outbreaks. Moreover, they invariably refe to abundance, never to rarity. On making comparisons of early grasshopper activities we must therefore, rely wholly upon the records of the insects in vast numbers and assume that the indigenous insects were usually at the height o their activities at similar times. Needless to add this only furnishes us with approximate data.

From a review of the literature we discove that there have been at least 32 years when grasshoppers were abundant between 1800 and 1930 these were 1800, 1802, 1808, 1818, 1819, 1821, 1830 1851, 1858, 1864, 1865, 1866, 1867, 1868, 1869 1870, 1872, 1873, 1874, 1875, 1876, 1898, 1899 1900, 1901, 1902, 1903, 1912, 1919, 1920, 1921 1922. While the above records are all from Manitoba it must be borne in mind that a number of them undoubtedly relate to invasions and it is highly probable that in some of them the grasshoppers originated in regions quite remote from the province.

A reference to the accompanying chart—admittedly incomplete in respect to grasshoppers—will indicate the extent of the correlation between grasshopper fluctuation and sunspot cycles. (Fig. 1).

It will be noted that the first grasshopper outbreak of which we have any record, namely that of 1800, immediately followed a period of sunspot minima. The next one, 1808, was also during a low sunspot period although it began to rise and attained its maximum before the minimum of sunspots. The year 1818 was one of maximum grasshopper activities. Its rise in 1817 was almost at the height of a sunspot period while at its greatest intensity it was half way down the sunspot decline. This great outbreak, however, had visibly fallen before the low ebb in sunspots was reached. There was a light grasshopper outbreak recorded in 1830 and in the neighbouring state of Minnesota one was recorded in 1842 and in Dakota another occurred in 1853, but in Manitoba we had no further trouble until 1857 when the great outbreak, which extended with variable intensity until 1876, began. At this time any relation to sunspots was almost entirely absent and the insects maintained their numbers even over the great sunspot year of 1870. This as we shall point out later, was doubless due to repeated invasions from other sections of the continent. After this period there was a low ebb in grasshopper activity which lasted until 1898 when the insects again began to rise in numbers and by 1901 they had attained another high point. A reference to the chart will show that this outbreak had its inception considerably before the sunspots had reached their minimum but that its maximum closely coincided with the minimum in sunspots. The 1912 peak in grasshoppers again had its rise half way down the sunspot decline but the much more intensive outbreak of 1919-23 began well up the sunspot peak and was falling before the minimum was reached.

By far the most important evidence in our chart begins with the year 1882 because we know that all grasshopper outbreaks after that time have been of local origin, whereas before that date the rise or fall of indigenous species is only conjectural. Nevertheless the evidence from the records of early outbreaks is by no means without value and there is much which indicates a correlation between grasshopper and sunspot cycles.

That there is a correlation between sunspot minimum, or decline, and a rise in the number of grasshoppers seems evident, but the presence of a number of other factors greatly complicates the problem and often obscures what might otherwise be plain.

On reviewing the accounts of early grasshopper outbreaks in Manitoba it becomes evident that a majority of these were due to invasion from foreign territory, more often than not from far to the southward. Thus we find several records of the winged insects appearing in June at a time when the local grasshoppers of the same species would be little more than half grown. This means that the invaders had their inception several

Chart showing Sunspot and Grasshopper Cycles. The upper curves represents grasshoppers, the lower ones Sunspots (Original)

hundred miles to the south of us. These foreign swarms nearly always left their eggs in the invaded territory and their progeny, hatching the following spring, played far greater havoc with the crops than their progenitors had done before them. As a rule the progeny on acquiring wings, flew elsewhere, and unless fresh swarms arrived the country might be comparatively free from grasshoppers the following year.

The point to be emphasized in connection with these invasions is that the invaders probably originated in more arid sections of the continent where increased rainfall might actually be a benefit to the grasshoppers by stimulating plant growth and providing water for drinking, whereas extreme aridity might, in these sections, be less favourable to survival. In other words while the minimum rain period might benefit local grasshopper development, in arid areas a converse condition might be more favourable. The mean rainfall necessary to increase being the same in both cases although occurring at opposite phases in the sunspot cycle. If this were so then it would explain the invasions of Manitoba which took place during supposedly adverse local conditions.

There is reason for believing that the great grasshopper period from 1857 to 1876 was maintained by repeated invasions, rather than through the reproduction of local species and that the 1817-18 outbreak was also due to invaders. If this was so then the almost negligible local correlation with sunspot influence at those times is explained.

The next group of factors which complicate the rhythm in sunspot-grasshopper periodicity are parasites, predators and diseases. As a rule the first essential to grasshopper increase is an absence of the more important natural enemies, nearly all of which are insects. It is largely due to insect enemies that grasshoppers are not in perpetual outbreak in certain favourable sections of the country and there is little doubt that a marked fluctuation, due to insect enemies, occurs irrespective of either sunspot cycles or any other natural phenomena. It is doubtless due to this fact that the increase in grasshoppers often begins well up in the maximum sunspot period and declines before the minimum in sunspots is reached. Furthermore, there is the probability that some of the natural enemies are more susceptible to certain meteorological conditions than are oth-

ers and if this is so further complications arise.

Were it necessary only to rely upon a knowledge of sunspot periodicity to foretell grasshopper outbreaks our task would be an easy one, but unfortunately this is not the case. Grasshoppers, like other insects, are profoundly affected by the relative prevalence of their natural enemies which alone may reduce them to insignificance or, being absent, enable them to rise to greater abundance. It is to these natural enemies, parasites, predators and diseases, that the sudden drop from epidemic to endemic conditions is usually due, but having reduced their hosts to scarcity these enemies are themselves reduced through a lack of grasshoppers upon which to subsist; the result being that the downward phase of the oscillation is almost independent of weather.

The influence of sunspot variability on the flora and fauna is still far from being understood although the available evidence indicates that there is a correlation between the periodicity of sunspots and the more pronounced meteorological changes. If this is so then there is every reason for supposing that life would be similarly affected by the meteorological changes. It is scarcely necessary to add that such knowledge would be of immeasurable value as an aid to forecasting insect activities and it might furnish us with at least one of the reasons for grasshopper fluctuation. We believe, after reviewing the evidence summarized above, that there is a distinct correlation in the periodicity of sunspots and grasshoppers and, omitting the possibility of invasions, we should expect a high point in grasshopper prevalence approximately every eleven years and that this maximum in abundance is to be looked for, on an average, at the minimum sunspot period, although the increase may begin well up the sunspot decline and there may not be much abatement in its intensity until the low sunspot period is past. Our next grasshopper outbreak, according to this theory should reach its high point in 1932, which, as a matter of fact, there is every prospect of its doing. As we have already pointed out, there are several factors which militate against so simple a forecast and all we can reasonably claim in this connection is that the meteorological conditions favourable to grasshopper increase, will probably be at their best during the period we have stated. It will be the task of the entomologist to ascertain the biological conditions prevailing at the time and to take these into consideration when making his forecasts.

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*A NEW VARIETY OF VALVATA LEWISI FROM THE PLEISTOCENE OF ONTARIO**

By A. LA ROCQUE

IN A SMALL collection of marl shells from Shallow Lake, Grey County, Ontario, received from Mr. W. R. McColl of Owen Sound, there occurs a loosely coiled *Valvata* which belongs to the group of *Valvata lewisi* Currier but appears to be new.

Valvata lewisi mccolli var. nov.

Shell of fair size for the genus; whorls, three. The first one and one-half in contact with each other and coiled almost in the same plane; the last one and one-half loosely coiled and free, forming a rapidly descending tube. Sculpture of fine, thread-like lines on all three whorls of the shell, as in typical *lewisi;* there is no trace of spiral lines. Aperture rounded; peristome simple.

Type locality and horizon: Shallow Lake, Grey Co., Ont.; in marl of late Wisconsin age (Pleistocene). Collected by W. R. McColl.

Types: Holotype, N.M.C. No. 7392; paratypes N.M.C. Nos. 7392a and 7392b. Deposited in the National Museum of Canada.

MEASUREMENTS

in millimetres

			Lgth.	Wdth.	Ap. L.	Ap. W.
Holotype	N.M.C.	No. 7392	3.5	3.5	1.25	1.25
Paratype	"	" 7392a	4.5	4.0	1.75	1.5
Paratype	"	" 7392b	3.25	3.5	1.5	1.5

Remarks: This variety of *Valvata lewisi* is near to *ontariensis* Baker (Nautilus 44:119, 1931), but differs from it in its larger size and especially in the absence of the rib-like lamellae on the last whorl. Named in honour of W. R. McColl Esq., the collector of the type lot.

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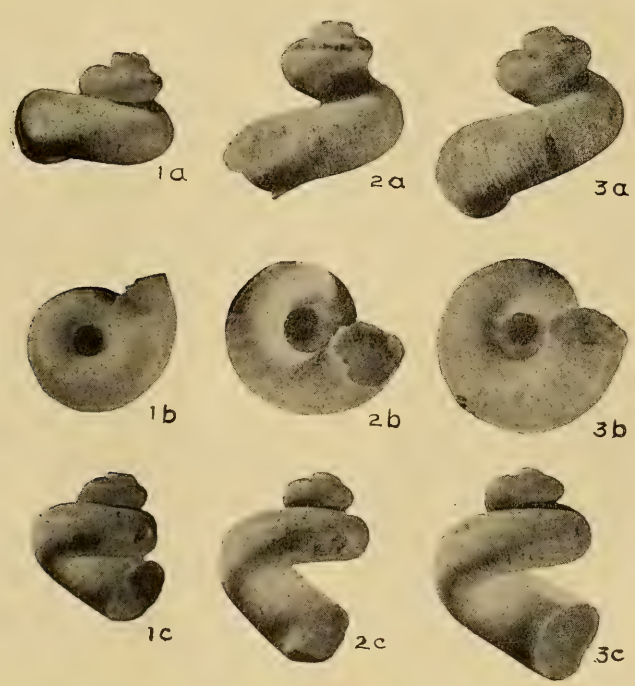
EXPLANATION OF PLATE.

All figures eight times natural size.

1. *Valvata lewisi mccolli* var. nov. Paratype 1, N.M.C. No. 7392b. a. Side view; b. umbilical view; c. side opposite aperture.
2. *Valvata lewisi mccolli* var. nov. Holotype N.M.C. No. 7392. a. Side view; b. umbilical view; c. side opposite aperture.
3. *Valvata lewisi mccolli* var. nov. Paratype 2, N.M.C. No. 7392a. a. Side view; b. umbilical view; c. side opposite aperture.



A THIRD STUDY OF THE HOME LIFE OF THE EASTERN GOLDFINCH

(*Spinus tristis tristis*)

By HENRY MOUSLEY

IN REFERENCE to my previous studies[1] of the home life of these charming little birds, it will be found that they embrace —for the most part—the later stages only, whereas, the present one covers the period from the laying of the first egg to the final departure of the young birds from the nest, a matter of practically four weeks, or to be precise, twenty-seven days, so that my title might very well have been "A Month with the Goldfinches", had it not been for the fact that this had already been pre-empted by Miss Bruce in 1898[2].

For the benefit of those not having access to the above studies, I might briefly state that in the first one the fact was brought out that the rate of feeding the young was once only in every 53.3 minutes, this agreeing very well with Miss Bruce's account of about once an hour. After my experience with the Warblers, this continued slow rate of feeding came as a great surprise, so much so that a second study was undertaken to see whether these conditions held good at all times. During the seventeen and one-half hours I was at the nest in the second study, the average rate of feeding on one occasion worked out at once in every seventy-five minutes, this being even longer than previously, but on two subsequent visits, the rate was about once every half-hour, thus proving that at times the rate of feeding does vary somewhat, although, taking it on the whole, the rate is very much below that of the Warblers, and probably other birds as well, for in this third study extending over fourteen days, and embracing sixty-six hours of intensive watching, the average rate of feeding for the whole period works out at once in every 49.5 minutes, whilst that for the first seven days—when brooding was in progress—comes out at once in every 43.1 minutes only. Imagine young Warblers being fed on lines similar to these, their average rate—as a rule—working out at once in every ten or twelve minutes!

Following this brief survey of former studies, let us now return to a consideration of the present one. The nest, as in the case of the other two, was found in the same general district, about six miles from Montreal, on the southern side of the St. Lawrence River, and not far from St. Lambert. It was placed in the forks of a small birch tree—the general favourite in these parts—seven feet above the ground, and on August 22 contained one egg. Three others were added, one each day, until August 25, when it contained four eggs, the female having commenced to sit, I think, on the second day; at least, she was found on the nest, in the afternoon of that day, this agreeing with Miss Bruce's account, as her bird began to sit—at least, it was said to have by a young friend—on the second day, although, in that instance the nest eventually contained six eggs. It was not until early on the morning of September 5, that the first two eggs hatched out, followed the day after by the third, whilst the fourth eventually proved to be addled. It will thus be seen that a fortnight elapsed between the laying and hatching of the first egg on September 5, on which date I lowered the nest four feet for photographing purposes, thus making it three, instead of seven feet, above the ground. On the return of the female, she seemed somewhat nonplussed at the altered condition of things, flying several times through the place where the nest had originally been, the force of habit of continually going to this same spot being in the ascendant at the moment, regardless of the fact that there was now no longer any nest there. This mode of behaviour I have found general with most small birds, whenever alterations to their nests have been made, but they usually adapt themselves to the new order of things in a very short time, as this one did, for she both fed and brooded the young with little further ado.

At this juncture, it may be well to mention the fact that neither on this, or any subsequent occasion, was the male ever seen at, or near, the nest, and I can only surmise that during the incubating period he must either have met with some accident or else joined a band of roving Goldfinches, these birds being particularly numerous again this year, my friend Mr. Terrill telling me that he had found no less than seventy-five nests in this same district.

It was the loss of her partner's help in assisting to feed the young that first drew my attention to the benefit a brooding bird derives from the method of feeding by regurgitation, for on the present occasion, during the three hours I was at the nest, the female had only to leave it on two occasions to gather food, instead of nine normally, for she fed the young that number of times, at different intervals, by merely raising herself off

[1] *Canadian Field-Naturalist*, 44: 177-79, 204-07, Nov., Dec., 1930.

[2] Bruce, Mary Emily. A Month with the Goldfinches, *Auk*, 15: 239-43, 1898.

them, and pumping the partially digested food—which on this, and the next few days, seemed very liquid—into their mouths.

On arrival at 9.30 a.m. the following morning (September 6), the female was brooding and did not leave the nest for another half-hour. It was then found that one of the two young birds had mysteriously disappeared, so that there now remained only one young and the two unhatched eggs in the nest. Things went on very quietly for a time, in fact, until shortly after noon, when I noticed that something unusual was taking place, the female moving uneasily about in the nest, until presently lifting up part of a broken egg shell, she proceeded to eat it, holding it in her bill whilst nibbling it away by degrees. After devouring this half, she lifted up the remaining portion and consumed it in the same manner as the first. This was interesting, in view of the fact that as a general rule, I think, parents have been supposed to carry off the empty egg shells and not to eat them.

Shortly after this on going to look at the new arrival, I noticed the remaining egg had a slight dent in it, and when lifting it up, how very light it was. On further investigation, it proved to be addled, so I broke it in two, the dried up yolk inside making a third portion. These three I replaced in the nest, in order to see what the female would do with them on her return. I was not kept waiting long, for immediately she returned and caught sight of the two pieces of shell, she ate them both in the same manner as before, and later carried away the piece of dried-up yolk, it being too hard for her to eat, although she did nibble at it for a time. During the five hours I was at the nest, the young were fed on twelve occasions, the time spent brooding being three hours and thirty-six minutes, out of the total of five hours. Up to the present time, I had taken one photograph only of the young, soon after hatching on the 5th, showing the egg tooth, but before leaving to-day I decided to begin on the morrow, the 7th, and take a series of pictures showing the development of the young, and the principal happenings each day at the nest. To begin as you intend to go on, may be all very well in theory, but in practice it does not always work out, especially in bird work, the consideration of the young—as a rule—being the stumbling block, which it was in the present instance. Arriving at the site at 8 a.m., I found the female brooding, so waited until she left the nest before commencing operations. After pictures of the young had been taken, the camera was placed with the lens two feet six inches from the nest, a distance I very often adopt. In this case, however, it proved to be too close, at least to begin with, for on returning the female would not face it, and after waiting several hours, I had at last to admit defeat, although in another half-an-hour I am sure her maternal instincts would have overcome the sense of fear, for she had been coming closer and closer to the nest, in fact had once perched on it. However, as already mentioned, it was consideration for the young and the fear of losing them, that finally decided me to suspend operations at the last moment, when success seemed certain, and allow the mother to feed them. She had been absent for a considerable period, in fact four and one-quarter hours. During the whole of that time, however, she was seldom out of sight of the nest, and being myself but twenty-five feet away, I naturally kept a close watch over the young, to prevent anything like their collapse taking place. Only those familiar with the home life of a Goldfinch know what liberties can be taken with their young, as compared with those of the Warblers which latter, I imagine, could hardly have withstood such a strain, in the hot weather it was, without disastrous results. However, the young Goldfinches seemed none the worse for it, neither on this nor on a former occasion—mentioned in *The Canadian Field-Naturalist*[3]—when I tried the parents for over three hours without getting them to face the camera, which on that occasion was placed at about the same distance from the nest. It is only by experiment, however, that one can tell exactly how a bird is going to act, a pair of Maryland Yellow-throats (*Geothlypis trichas trichas*) earlier in the season, making little or no fuss under similar conditions, in fact making use of the legs of the tripod to perch on when going to or coming from their nest. On returning the following morning at 8 a.m. (September 8), the female being absent, I set up the camera again, only this time at four feet from the nest, instead of two feet six inches, as previously. I had not long to wait before the female returned, when, instead of over three hours, it was only fifteen minutes before she fed the young, somewhat nervously certainly, and then apparently was afraid to brood them, merely getting in and out of the nest continually. However, as generally happens, this nervousness soon passed off, and she both fed and brooded the young in a normal manner. Tiny slits were now beginning to show in the eyes of the older bird, but those of the younger ones were still closed. The mother seemed to gather most of the food in a north-easterly direction, generally leaving the nest and returning to it from that direction.

On arrival the day following (September 9) the

[3] *Canadian Field-Naturalist*, 44: 205, Dec 1930.

female was brooding, but later on when she left, I took some pictures of the young whose eyes were now beginning to show signs of opening. The gape was yellowish, but there were no spots or pads in the mouth, apparently, which was of a bright red colour. Patches of down were prominent on the head, as well as other parts of the body, especially the wings. It was very hot —in fact throughout the study the thermometer ranged from 74° to 94°—and both parent and young were feeling the effects of it, panting with wide open mouths nearly the whole time I was with them.

On the next, or sixth day of watching, it was again very hot, and both the birds and myself were feeling the effects of it. There were many interesting happenings, however, to distract one's attention from personal inconveniences. The eyes of the young were now almost fully open and they were beginning to take notice of things, with their heads hanging over the rim of the nest. Feather tracts were showing on the wings and down the centre of the back, and for the first time they began to void over the rim of the nest. Up to the present the mother had disposed of the fæces by eating them, but on this day she carried one fæcal sac away. Owing to the heat a good deal of brooding was done by the mother standing up in the nest, or on the rim, and shielding the young with outstretched wings, whilst panting for breath with wide open mouth, this being the method by which birds keep their temperature down in high summer. That is to say that during hot weather birds lose their superfluous heat by breathing hard and breathing often. The outgoing breath from their lungs and air-sacs contains both the excess of heat and of moisture that we get rid of by perspiring. Hard and continuous breathing is their safety valve, and in order to allow as much heat as possible to escape by radiation, they frequently erect or puff out their feathers as well. How many of us realize, I wonder, how a young bird must suffer from thirst also during hot weather, for it can get no real water to drink for the first ten to fourteen days or more of its life. Fortunately, however, nature has to some extent provided against this contingency, from the fact that most young birds are fed by their parents on soft juicy foods such as insects, worms, soft green caterpillars and the like, and it is from these that young birds can in some way assuage their thirst, young Goldfinches being particularly fortunate since their food is regurgitated to them in the form of a paste, perhaps three parts solid, and one part liquid, a kind of creamy mixture which can be easily swallowed and digested as well as serving the part of a thirst assuager also.

On the morrow, or seventh day (September 11) brooding the young practically came to an end, with the exception of perhaps five minutes the day after, which can be ignored. The eyes of both young were now fully open, and as the female became quite accustomed to the camera, I decided in future to place it at three, instead of four, feet from the nest. If, as it often happened, both young voided practically at the same time after being fed, the mother would eat one sac, and fly off with the other, three good pictures being obtained of this event on the 12th. The next day it was very hot indeed, the young feeling it keenly, as with wide open mouths they hung their heads over the rim of the nest, the outside of which was now beginning to show the usual signs of fouling, owing to the neglect of the parents of this and kindred species in removing the excreta voided by the young. The feeding was most regular and consistent, first one young bird and then the other receiving a portion so long as the supply lasted. The mother nearly always gave notice of her approach to the nest by one or other of the various notes employed by these birds, in fact she had done so from the very first, and continued doing it to the end, with very few exceptions. Her approach to the nest, likewise, was nearly always from the rear, making use of certain twigs and branches to let herself down through the small birch tree to the top of a favourite stump, from which she finally landed on the nest itself.

Things went on much as usual for the next few days, agreeing for the most part with my former studies of the later stages of home life, the young being fed about once an hour, until September 18, or the fourteenth day of watching, when, on arrival at 8.30 a.m., I found the elder of the two young perched on a twig at the side of the nest. On replacing it with the other, it remained for a time, but it was plain to be seen that the mother was doing her best to induce them to leave their home, by the usual method of not feeding them. Time and again she would perch on, or near, the nest, and then fly off a little way, until, at last, the elder bird took courage and left, followed shortly after by the other one. I can see them now as I write, the last picture taken depicting them standing almost side by side, often preening their feathers, and being fed by their mother, one at a time, not turn about as before, their position on the branch not allowing of this latter method.

Altogether, I had spent seventy-one hours at the nest, sixty-six of which were devoted to intensive watching, during which the young were

fed eighty times, or at the rate of once in every 49.5 minutes, for the whole period, whilst for the first seven days, or brooding period, the rate works out at once in every 43.1 minutes—as already mentioned. The total time spent in brooding was twelve hours and thirty minutes, out of the total of sixty-six hours, whilst the number of broodings was forty-seven, thus giving an average of sixteen minutes for each brooding.

In conclusion, the appended table furnishes a summary of all the principal happenings at the nest.

TABLE OF SUMMARIES

Species	Period of Observation, 1931	Hours	No. of Times fed by Female	No of Times brooded by Female	Total time brooded hours minutes	Times fæces eaten by Female	Times fæces removed by Female	Remarks
Eastern Goldfinch.....	Sept. 5.....	3½	9	8	1.53	7	.....	2 eggs hatched
	6.....	5	12	8	3.36	9	.....	3rd hatched
	7.....	4	5	6	1.56	4	.....	(4th addled)
	8.....	8	9	9	1.46	8	.....	
	9.....	8	9	10	2.49	9	.....	..
	10.....	6	6	4	1.40	5	1	
	11.....	5	5	2	.50	4	1	
	12.....	6	5	.....	.....	5	3	
	13.....	5½	4	.....	.....	1	3	
	14.....	5	5..	.....	.....	1	5	
	15.....	.....	.....	.....	.....	.....	.....	Wet day.
	16.....	5	4	.....	.....	3	5	
	17.....	.....	.....	.....	.....	.....	.....	Wet day.
	18.....	5	7	.....	.....	.....	.....	
Totals.....		66	80	47	12.30	56	18	

Average rate of feeding over the whole period = once every 49.5 minutes.
Average rate of feeding for the first seven days = once every 43.1 minutes.
Total time brooding = 12 hours, 30 minutes.
Number of times brooded = 47.
Average length of each brooding = 16 minutes.

*A DINOSAUR FOOTPRINT BIRD BATH**

By C. M. STERNBERG

MILLIONS of years ago, before the Rocky Mountains began to push their mighty shoulders skyward, dinosaurs roamed over part of that section of the country now occupied by Alberta and British Columbia. During that period, which geologists call the Lower Cretaceous, the foothills section which is now traversed by the Peace River, was a low-lying country of many lakes, swamps, and peat bogs. Deposition in this region was very slow as shown by the presence of many seams of clean, semi-bituminous coal up to six feet in thickness. Between the coal seams are numerous layers of thin-bedded, ripple-marked sandstone, shale and clay-ironstone. These probably mark the shoreline of some lake or the bottom deposits of shallow bays or ponds. At some localities the impressions or carbonized remains of rushes or other plants are preserved in a vertical position showing that they grew up through the different layers or were covered by layers of mud or sand which filled the lakes. Mud-cracking is indicated on certain strata.

On many of the strata are preserved the footprints of dinosaurs which trod these shores in the dim and distant past. Dinosaurs must have been numerous in this region for hundreds of their tracks are preserved in the small area which has been exposed, in the Peace River canyon, where the river has cut a narrow gorge through the foothills. They were observed at various levels throughout over 400 feet of vertical strata. This shows that they occupied this region for many generations.

It is probable that after the dinosaur walked over the sandy shore or mud flat and left the

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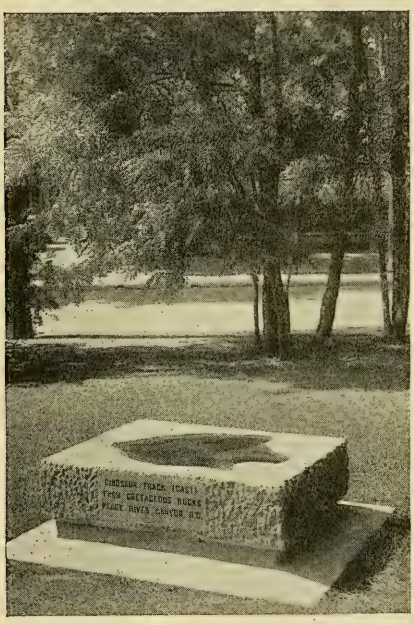
imprint of his feet, the sun dried the surface, so as to make a cleavage plane between this and the next layer of mud which was deposited. Or if the imprints were made under water the settlement of a slimy film or the deposit of a different type of sediment would make a cleavage plane so that the mud which filled the track would separate from the imprint. No doubt thousands of other tracks were made and filled but as there was no cleavage plane their presence can not be detected.



Dinosaur Footprint Bird Bath

Eight species of dinosaur footprints, ranging from less than 6 to 25 inches in length, were collected. The largest of these has been cast in concrete and mounted on a low base, in the grounds of the National Museum at Ottawa. This is a reproduction of a track described by the writer as *Amblydactylus gethingi*[1] signifying blunt-toed. The dinosaur which made this track is not known from the fossilized skeleton but the short, bluntly-pointed toes would suggest a herbivorous type similar to the European *Iguanodon*.

The imprint (Fig. 1) is 25 inches long, 23½ inches in greatest breadth and has an extreme depth of more than 4 inches. The sole of the foot was more deeply impressed than the toes. Behind the impression of the "heel" the rock slopes upward and backward. This probably represents the impression of the posterior edge of the metatarsals which were not quite perpendicular above the phalanges as the animal walked.

At almost any time of day, during the warm weather last summer, birds could be seen enjoying a dip in this unique bath-tub. Those most often noticed were house sparrows, robins, bronzed grackles and catbirds. Though there was a colony of purple martins nesting near-by they were never observed in the bird bath.

[1]Sternberg, C. M., Ann. Rept. 1930, Nat. Mus. Can., pp. 72-73, 1932.

OBSERVATIONS ON THE OCCURRENCE OF OTTER IN THE RIDING MOUNTAIN NATIONAL PARK, MANITOBA, IN RELATION TO BEAVER LIFE

By H. U. GREEN

PRIOR to a few days before Christmas, 1930, otter were thought to be extinct in the Riding Mountain, Manitoba (now the Riding Mountain National Park), as neither otter nor otter signs had been seen for many years. I was then informed by an old trapper, now employed by the Park authorities in a less destructive capacity, that he had observed otter tracks in the snow near Lake Audy, close by Jackfish Creek. This small stream was then open in places, but froze up throughout its entire length early in January, 1931. I made notes of his observations.

On February 3rd, 1931, when on patrol in the Park, I visited a beaver pond situated in the valley of the Vermilion River, one mile west of Mile 32 Cabin, Strathclair Road, known as Site No. 2. The Vermilion River at this point is a very small stream usually drying up in the fall of the year. The pond in question, however, is spring fed and brim full at all seasons. The deepest part of the retaining dam is the filling in the river bed some 10 feet wide and 9 feet deep. The surplus water finds its main outlet over the crest of the dam immediately above the river channel. The area flooded fills the entire valley and is approximately 4 acres in extent. Six beavers inhabited the pond; a male and female with their four "kittens" born during the latter part of May, 1930.

The pond was previously visited on January 24th, 1931. It was completely frozen over, except for a narrow area near the crest of the dam above the river channel where a small stream of water trickled away.

On February 3rd, 1931, the entire surface was covered with ice. The temperature in the meantime had constantly remained at several degrees below zero F. On this occasion I noticed that the ice had sunk away from the inner face of the dam through the lowering of the water. Here and there on the snow-covered surface of the pond other depressions were visible. At one place beside a sloping hummock towards the centre the ice had given way and upon close examination it was evident from the beaten surface of the snow close by that some form of animal life other than beaver had used the aperture thus created as a means of entering and leaving the pond.* There was a 9 inch air space between the undersurface of the surrounding ice and the water level. The water was thinly frozen immediately beneath the aperture. Upon further investigation the tracks of at least two otters were unmistakably evident on the snow in the vicinity. They were confined to a small area and gave the impression that the otters had left the pond for a short time and then returned to the water.

I next examined the dam and found that a portion of the outer surface had been torn away and a hole made through the entire structure at a point 10 inches below the crest. The resulting aperture measured roughly 10 inches by 10 inches. A trickle of water flowed through the aperture from the pond forming a solid mass of ice beneath. Thinking that the destruction may have been accomplished by poachers I searched for human signs, but nobody had been anywhere in the vicinity. Otter tracks, however, were visible in the snow on both banks of the river a few feet below the dam. Two dumps of fresh otter excrement were observed close by. Both contained masses of fine felted hair which later proved to be muskrat fur. (A few muskrats frequent the pond). There was life within the "island" lodge, the only beaver habitation. A thin feathery wisp of vapour could be seen arising from the apex of the otherwise snow-covered cone.

I visited the pond again on February 27th, 1931. In the meantime a light snow had fallen. There were no fresh otter signs. The breach in the dam was partially closed with ice and no life had recently left the pond via the hole beside the hummock. I could hear beaver stirring inside the lodge.

As a keen observer for the past 25 years of all western and sub-arctic forms of mammalian life there is no doubt in my mind from the strong circumstantial evidence presented that the otters referred to deliberately breached the beaver dam at Site No. 2 for the purpose of gaining access to the pond and creating an air space to enable them to remain therein for some appreciable time. One may wonder what prompted their action. I would think the necessity of securing food. This seems a logical explanation when one considers the lack of any open streams or lakes in the Riding Mountain during the major portion of the winter season. In the spring, spawning fish "run" the creeks and small rivers draining the several lakes. In the summer many small species exist in pot holes and beaver ponds. During the winter every beaver pond and deep pot hole supports its quota of finny inhabitants.

From the evidence gleaned at a later date however, tragedy played an important part during the otters' winter visit to the beaver pond known as Site No. 2.

On June 10th, 1931, I and the Apache Indian "Grey Owl" proceeded to the pond with a canoe for the purpose of securing two young beaver "kittens" to augment "Grey Owl's" colony at Clear Lake, but the pond appeared deserted of beaver life.

Determined, if possible, to ascertain the fate of this colony I visited the pond on June 19th, 1931, and spent the entire day in serious investigation. One adult beaver was seen. Towards evening I found the partially decomposed carcase of an adult female beaver in the tall grass bordering the north shore of the pond. The remains contained five badly decomposed beaver embryos. There were still unmistakable lesions of deep festered sores behind the shoulders and on the right flank which only rending teeth could have inflicted. What killed this beaver? Could it have been the visiting otters and that death eventually claimed a victim of their attack? The four "kittens" of the previous year presented no problem as, at least in the Riding Mountain, they leave the home pond in the early spring following their birth taking up their abode elsewhere until, as two year olds, they again wander abroad in search of mates.

That the otters remained in the Vermilion River country was proven prior to my visit to Site No. 2 on June 19th, 1931.

On June 11th, 1931, I and "Grey Owl," again

* Possibly used as a "slide".

in quest of beaver "kittens," captured one little fellow in a pond known as Site No. 1 situated in the valley of the Vermilion River two miles above Site No. 2. This pond contains two lodges, both used by members of the same family. One is an "island" lodge; the other a "bank" lodge. During the afternoon fresh otter excrement containing feathers and the undigested bones of a wild duckling was observed on the side of the "bank" lodge. Between May 24th and June 11th, 1931, my observations of this colony showed that the adult male had occupied the "bank" lodge in solitude. The female and her later born "kittens" resided in the "island" lodge. In previous years the adult male left the pond about the time the female was expected to give birth to the annual increase, not returning for several weeks. On June 11th, 1931, all were in the "bank" lodge, less the captured "kitten." Usually both adults would come when they were called and play in the water in anticipation of receiving such beaver delicacies as apples and carrots. On this occasion they seemed afraid to leave the lodge, but, nevertheless, would answer when we "spoke" to them using our usual expression *"mough-ow-ee,"* uttered in a soft crooning tone. The loss of one "kitten," taken near the "island" lodge, might explain the reason for the two adults seeking comfort and protection together at a time when they usually remain apart, and for their failure to respond to our enticements. But from my knowledge of their habits I am inclined to think that the presence of otters in the pond made them fearful of possible direful consequences.

I visited the pond frequently thereafter without noting any fresh otter signs.

On July 13th, 1931, I passed the pond in company with Mr. James Smart, Park Superintendent. As we stood beside the water talking "beaver" three adult otters broke surface a few feet away remaining in view for about two minutes. The same afternoon they left the vicinity, for I tracked them a distance of half a mile below the dam. They have not been seen since. During their stay at Site No. 1 they apparently did not molest the beavers, perhaps for the very good reason that they were not afforded the opportunity. A few days after their departure I experienced no difficulty in calling the adult beavers from any part of the pond. Between June 11th, 1931, and July 13th, 1931, I could seldom do so. They seemed reluctant to show themselves. No doubt the otters were thereabouts during all this period. At least several broods of wild ducklings mysteriously disappeared.

Owing to the obvious scarcity of the otter in the Riding Mountain I think it may be logically assumed that the individuals who visited Site No. 2 during February, 1931, and Site No. 1 in June and July, 1931, are the same otters whose tracks were observed near Lake Audy a few days before Christmas, 1930. The shortest distance across country from Lake Audy to the Vermilion River is about 12 miles and devoid of any intervening watercourses—a jaunt normally presenting no difficulties to these nomadic mammals. What would they subsist upon during the journey in the depths of a sub-arctic winter across inhospitable terrain unless mice and shrews were captured and devoured in the emergency? Consequently, after a discursion of this nature the presence of a more natural diet of fish, and perhaps an occasional muskrat, would furnish ample incentive to enter beaver ponds in search of sustenance and the material comfort of a generous environment.

That otter will molest beaver is, I think, proved by the obvious fear of the inhabitants of Site No. 1 during the period the otters frequented their pond. That they will kill them may be thoughtfully inferred from the circumstantial evidence gathered from the examination of the beaver carcase found on the banks of Site No. 2.

To support the latter belief several of my Indian friends, including "Grey Owl," have informed me on different occasions that two or more otters will "gang" and kill an adult beaver in water if found alone. They tell me, too, that otter will kill and eat beaver "kittens" at every favorable opportunity.

Whatever relation normally exists between the beaver and the otter, the foregoing circumstances may prove of interest to other serious-minded investigators. Further substantiation of course is necessary before final condemnation of the otter as being detrimental to the well-being of the beaver generally.

Nevertheless, while one hesitates to advocate the destruction or confinement of any fast-diminishing animal species, it would appear that there is every reason to believe that the otter and the beaver inhabiting the restricted and sparsely watered terrain of the Riding Mountain, Manitoba, cannot exist together if the miserable remnant of beaver life is to remain unmolested and receive the sympathetic consideration and protection it so sorely needs.

THE LAST OF THE HEATH HENS*

By P. A. TAVERNER

IT IS A SAD THOUGHT to consider the passing and extinction of a race. In the history of the world this has occurred again and again. In fact the history of life on this earth has been of a constant succession of the rising, flourishing, declining and final disappearance of line after line of living creatures, each making room for the next and vanishing into oblivion, leaving as record of their passing only occasional enigmatic fossil fragments, a tradition in some tribal memory, a line in an old book of travel or a few treasured specimens in our museums. Usually in the hurly-burly of vital competition unique forms have dropped away unnoted and unmourned. In each case there must have been some single survivor of its race that struggled along for a while and then passed silently from the picture. Can anything be imagined as sadly lonely as the last surviving member of a once dominant species? In one case at least the event has been sympathetically watched to the bitter end. The final tragedy was foreseen and every effort of science and prescience was made to avert it, but without success. Before me lies the report of Dr. Alfred O. Gross of Bowdoin College, on The Last of the Heath Hen, probably the final report, for while the single old bird still existed in life at the time of writing (May, 1932), the final catastrophe can not be long deferred and may already have taken place.

The Heath Hen is a subspecies of the Pinnated Grouse or Prairie Chicken of the western plains that within early historical times inhabited the States of Massachusets and New Hampshire to New Jersey and probably Maryland. So common were they originally that papers of indenture specified that apprentices were not to be served with Heath Hen oftener than a limited number of times a week, yet in recent years the bird was to be found only in diminishing numbers on the island of Martha's Vineyard, Massachusetts. Strenuous efforts were made to preserve this last fragment of a race, and all the powers of the State, supported by conservation organizations and local feeling, were invoked in its protection and assistance. For a time success seemed achieved. In 1916, the number of Heath Hens on Martha's Vineyard was estimated at 800, or even more by some wardens, but by 1920 the number had dropped to 314. From then to 1924 when the last new brood was noted, numbers sank to 75, 28 and 17. The spring of 1927 saw 13 birds, but the autumn only 7, all males. In 1928 the numbers dropped from 3 in the spring to 1 in the autumn and that one is still surviving and has been noted annually since, including this spring of 1932. The solitary bird must be at least nine years old now and the end is not far in the future.

The factor that has rendered it thus possible to observe a single bird year after year is its specific habit of coming to traditional dancing grounds for its spring mating ritual. These dancing grounds are constant year after year, generation after generation. They may be ploughed over, or even a road made across them, altered out of all semblance to the conditions under which they were first established, but still the birds that once did their mating there return spring after spring at the urge of the procreative instinct, as long as they survive. It is on such a ground and on such a futile errand that the last of the Heath Hens is seen in mating time and where it has even been trapped, banded and released without breaking its continuity of habit.

The cause of the steady decline of the Martha's Vineyard Heath Hens in spite of all that man could do to the contrary, is obscure, but amply demonstrates how helpless we are to preserve any wild species when once the complicated environmental factors become antagonistic to its continuance. Numerous explanations have been advanced,—poaching, predators, especially the domestic cat, grass fires and ecological and climatic changes. Probably all these had their weight in the scale, but it is difficult to believe that any or all of them, in the face of the sincere efforts at their control, could have carried the species to extinction. It is a growing belief of many investigators today that disease, especially introduced poultry affections to which native New World species have not achieved tolerance through generations of experience, are at the bottom of much of the troubles of American upland game. We know how white man's diseases are deadly to many natives, how soon the white man succumbs in tropics where aboriginals flourish contentedly and we can well realize the probability that American grouse cannot survive contact with Old World poultry.

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A contributory factor must be considered but one that was probably of secondary and not of primary importance, as it would not have developed until the numbers had been reduced by other causes,—that is a progressive sterility of the birds from in-breeding. A number of males accidentally killed in 1925 were found with more or less atrophied sexual organs. Almost undoubtedly the last of the Heath Hens is similarly sterile.

Various suggestions have been made to supply the last male with a mate, a female of the closely related Prairie Chicken of the west, or even to introduce that species on the island. However, after due consideration the proposal was rejected. Whatever interest lies in the Heath Hen, it is purely sentimental, and no mongrel breed or allied strain would retain the traditional associations for which the race is most valued. If sportsmen wish to introduce a practical object of pursuit, it is another question. Let them do it as they can, but not to degrade the last days of the historic Heath Hen. The success of such transplanting is more than doubtful; judging from past experience it would be doomed to certain failure. The Prairie Chicken does not take kindly to new environment. Similar attempts have been made to introduce the species in other parts of New England and even to introduce the Heath Hen on its original habitat on Long Island, but never with success. On the whole it seems the course of both good sense and good sentiment to bow to the inevitable and allow the last of the Heath Hens to make its exit with dignity and with an undiminished halo of tradition.

CHRISTMAS BIRD CENSUS

The Bird Census Committee wishes to remind any interested readers to take a Christmas Bird Census on some day between December 20 and 28, and send a report of it to the Editor as promptly as possible. For the kind of report desired, see published reports of previous years.

NOTES AND OBSERVATIONS

DEAR MR. EDITOR,—Mr. J. A. Munro has advised me that there is a typographical error in the paper on the economic status of the American Merganser, by Dr. Clemens and Mr. Munro, which appeared in the October number of *The Canadian Field-Naturalist*. This error appears on page 167. The sentence—"The Red-breasted Merganser, on the other hand, occurs as is relatively small migrant on the interior lakes and rivers" should read—"The Red-breasted Merganser, on the other hand, occurs as a relatively scarce migrant on the interior lakes and rivers." —J. B. HARKIN, Commissioner, per Hoyes Lloyd.

KILLDEER AT OAKVILLE, ONTARIO.—On the morning of Feb. 14th, 1932, I noted a single Killdeer (*Oxyechus vociferus*) on the lake shore at the eastern limits of the town. The weather was cloudy with a strong westerly wind and the temperature about 26°F. The ground was clear of snow. At a distance of about 40 feet I had an excellent view with field glasses and am sure of the identification. This is the first time I have noted the bird in winter at Oakville and I cannot find any similar record in the literature I have on hand.—R. C. BROOMAN.

WILLOW PTARMIGAN, *Lagopus lagopus*, IN CENTRAL ALBERTA IN MAY.—On Saturday, May 16th, 1931, Mr. Robert Campbell, a prominent farmer, who lives eight miles south of Camrose, and less than two miles from the Battle River bridge, telephoned me that a bird, resembling a partridge in build and size, but whose plumage was mostly white, had been in his garden since early morning. I suggested that his description answered that of a Ptarmigan, but as this bird was unknown, even in winter, in this part of Alberta, it was more likely to be an albino grouse of some kind. I asked him to keep a close watch on the bird and I would go down and investigate immediately. Picking up two enthusiastic bird students, Messrs. Marshall and Burpee, who were attending the Camrose Normal School, we set out for the Campbell farm, and arrived there in less than an hour from the time I got the call. The strange bird had flown down the road a distance of about 40 rods, and picking up Mr. Campbell and his son, George, we cautiously approached the thicket in which the bird had alighted. Through the willows I could easily see that it was a Ptarmigan and I collected

it. It was a male in full summer plumage. Its crop was filled with poplar catkins, and small poplar leaves, which at that time were just bursting from the buds. There was no grain of any kind, nor weed seeds evident, and the bird was in excellent condition. I only know of one other record for the Willow Ptarmigan south of the North Saskatchewan River, and that was shot in the vicinity of South Edmonton, in winter, some years ago. Why this straggler should be in this latitude during the breeding season is a mystery.—FRANK L. FARLEY.

A KENTUCKY WARBLER AT STRATHROY, ONTARIO.—A trip East in the spring of 1931 kept me away from Southwestern Ontario from May 13th to 24th. This lost check on nearly two weeks of bird migration, but, as often happens to an enthusiastic naturalist, the one morning available after returning was to be remembered. Soon after daybreak the morning of the 25th found me in a wooded area two miles north of the town of Strathroy, Ontario, spending a very busy few hours in bringing my neglected migration list up-to-date.

The thrill of the morning came from following a song which at first was taken for the erratic song of an Ovenbird. The singer was finally collected from the top of a tall maple and proved to be a Kentucky Warbler in full plumage. The bird was found singing in a hardwood bush-lot composed principally of maple and beech, situated on the bank of a creek, a wood which has always been good for migrating warblers, particularly the later species. This is, I believe, the third Canadian record of the Kentucky Warbler; the specimen in No. 3884 in my collection. The second specimen was taken by Mr. Robert Elliott near Bryanston, Ontario, May 16, 1898*, which was the first record for Ontario, and is now in the Saunders collection.—A. A. WOOD.

NORTHERN SHRIKE AND ENGLISH SPARROW.—You might be interested to hear of an experience I had, two weeks ago, with a Northern Shrike. I was sitting in my log shack, writing, shortly before noon, when I heard the terrified shrieks of some small bird outside. Jumping up, and looking out of the window, I was just in time to see two objects apparently dash against the shack wall. Immediately there followed a great scuffling and more shrieking. I guessed the tragedy that was being enacted, but could not imagine how it was I heard the noise of the scuffle so plainly.

On going outside, I found that the pursued bird (an English Sparrow) had flown for protection through a crack between two boards, on a part of the wall that has never been properly finished. When I approached, silence reigned, but on my tapping the wall, the fluttering started again, and to my surprise out dashed a large Northern Shrike with the sparrow in his beak. Being rather a squeeze for him between the boards, he dropped the sparrow, and flew off to a near-by poplar.

The sparrow was quivering its last, so I picked it up and placed it on the window-sill outside, and went indoors to watch developments.

It was not long before the Shrike returned for his dinner, but, instead of going to the spot where the sparrow had fallen, he fluttered in front of the crack in the wall, much like a fly-catcher will do before a window. Satisfying himself there was nothing there, he alighted on a large stone directly in front of my window, and I had a splendid view of him. Then he spied his prey and flew boldly onto the window-sill, pecking at the sparrow viciously. Not being able to hold it with his foot, he soon picked it up in his beak and flew off.

I wished, afterwards, I had secured the sparrow in some way, and made the Shrike have his lunch with me. I might add that the fine, waxy lines across the breast were very faint on this particular Shrike. I have seen them much darker.—A. GISSING.

AN UNUSUAL RECORD OF SCARLET TANAGER.—Few better examples of the unusual wanderings of our land birds could be shown than that of a Scarlet Tanager in my collection. On November 17, 1926, I noted a green bird with black wings in a small cherry near my den window. As no such bird should have been in cherry trees at Comox on Vancouver Island in November, I gave chase. When I got outside the door the bird had gone but a hunt in the surrounding woods disclosed it in the alders and I secured it. It proved to be a young male tanager and with unpardonable carelessness I called the bird a belated Western Tanager (*Piranga ludoviciana*) and dismissed the case, never having seen the young of this species at this time of the year because of its early migration. Two years ago, however, on getting specimens of eastern birds I recognized my bird for what it is: the Scarlet Tanager (*Piranga erythromelas*), a species showing no other records for British Columbia, none for Alberta and few for Saskatchewan. This probably will stand as the most westerly record of the species for some time, though there still remains the width of the Island to cross—a small matter to a bird adventurous enough to negotiate the plains and the western mountains.—HAMILTON M. LAING.

Catalogue of Canadian Birds, John Macoun. Page 663, 1909. *The Canadian Field-Naturalist*, W. E. Saunders, 19: 205, Feb., 1906.

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